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USSR Report

ENERGY

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COAL

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MINE OPERATIONS, PERSONNEL TRAINING IN ARTEMUGOL'S ASSOCIATION

Kiev UGOL' UKRAINY in Russian No 7, Jul 84 pp 2-3

[Article by M. F. Malyuga, association general director: "Mine Operations and Worker Training in Artemugol' Association"]

[Text] In accordance with decisions of the December (1983), February (1984) and April (1984) plenums of the CPSU Central Committee, the Artemugol' Association is devoting a great deal of attention to the question of personnel training. The association includes nine mines representing a variety of complex geological conditions. We are working 10-25 steep beds 0.5-1.3 m thick (2-2.5 m in places) Depending upon the degree of metamorphism, the coal here belongs for the most part to the middle stage (ranks Zh, K and OS) and is used for coking.

With respect to the gas and dangerously explosive dust, the mines here are among the most dangerous. Most of the beds pose the danger of sudden blowouts of coal and gas and of mine tremors. The coal has a tendency to combust spontaneously. In a number of mines, in which seams are being worked at depths of 800-1000 m, the temperature of the rock exceeds 30 °C.

The Artemugol' Association has been modernizing and reequipping its enterprises over the past few years, and this has enabled it to meet its coal production targets and improve its performance with respect to still other technical-economic indicators. Association miners met their targets for the first three years of the Eleventh Five-Year-Plan period on December 28, 1983 and then went on to produce 75,000 tons of coal over and above the figure called for by the plan; they worked out 634 km, of which 15 km were above-plan.

The period 1981-1983 saw 143 million rubles in new capital investment by the association; we prepared and brought on stream new levels at the Izotov, Rumyantsev, Kondrat'yevka and Komsomolets mines and built a number of other new industrial facilities.

Also a factor in the association's successful performance has been the competition for early fulfillment of Eleventh Five-Year-Plan targets and plans among mine, section, brigade and worker collectives. Miners at the Kalinin and Gayevyy mines produced 235,000 and 227,000 tons of coal. In July 1983 V. I. Pavlov's tunnelling brigade at the Izotov mine fulfilled its five-year plan obligations, 98 miners met their annual quotas, while 11 fulfilled their own individual five-year-plan

obligations. F. M. Kushch, a miner at the Izotov mine, fulfilled nine annual norms, V. K. Zhilin of the Gayevyy mine six. We could point to many examples of high productivity on the part of miners who are doing their part in the effort to increase the economic strength of our motherland. Great and critically important challenges face our association miners in 1984 as well: we have to produce 7.33 million tons of coal without the introduction of new capacities. This is going to require 53.9 million rubles in new capital investment, 24.8 million of this amount for new construction and installation work. This will make it possible for us to prepare and bring new levels on stream at the Kochegarka and Kalinin mines, to add a degasification system and an administration and general services combine at the Kalinin mine, a cooling plant at the Gayevyy mine and a compressor unit at the Komsomolets mine among other projects. We are going to work out some 207.2 km and prepare 80 longwalls from 8.8 km of working face, which will provide the mine with the working front it needs.

In the effort to meet our plan targets and fulfill socialist obligations we are going to be looking primarily to increases in the level of the mechanization and automation of our production operations as well as to the introduction of integrated systems. The initiative launched by the foremost enterprises in Donetsk Oblast under the slogan "An above-plan increase in labor productivity of 1 per cent in Donetsk and another half-per cent cut in production cost with new ideas, new equipment and new technology!" has received widespread support and been extensively adopted in our association mines. Eighty of our longwalls are using advanced systems of working, the pillar system on 41 of these. On 63 longwalls we have introduced methods of controlling mine pressure such as complete caving, continuous lowering of the roof and completely filling in the worked out space.

At our working faces we are making increasingly extensive use of tunnelling machines, hydraulic supports and combines. Association mines have 45 mechanized longwalls, 35 of them fully mechanized. Mechanized coal production in 1983 reached 2.5 million tons, 2 million tons from fully mechanized longwalls. Mechanized production has now reached 36.7 per cent, that is, 7.4 per cent higher than the figure for 1980; production from fully mechanized longwalls is currently 29.2 per cent, or 7.5 per cent greater.

Introduction of tunnelling machines and hydraulic supports has made it possible to mechanize the difficult work of the faceman and to increase the safety of the conditions he has to work in. As a rule, this equipment is employed in working seams which pose particular hazards with respect to blowouts of coal and gas and mine tremors and where extraction by any other method would be virtually impossible. Loading is 40 per cent higher on a fully mechanized longwall, per worker productivity per section is 1.3-1.5 times greater and coal cost lower than in the case of a hammer-worked longwall.

Despite modernization and the reequipment of our enterprises, the number of workers in association mines is increasing. This can be attributed to social measures (shortening the working day, extending the length of the annual paid vacation time our miners are entitled to, rising numbers of miners who retire under preferred conditions, etc) and the difficulty and complexity of working at great depths, conditions which require extra steps to deal with blowouts of coal and gas, mine tremors, high temperatures etc.

The question of the training and education we provide our workers in preparation for their work in the mines is of immediate interest in this connection. Programs are offered by our training combine, which comprises the Kalinin branch, the machine operators school and the mine construction school, and 10 individual training centers. The training combine and its constituent branches offer instruction with time off from work to workers in the basic job categories: facemen, stopers, mine repair and maintenance specialists, tunnellers, underground electricians, mine machine mechanics, compressor mechanics and seismic forecasters. Particular attention is given to our machine operator training programs.

The combine's training facilities are located in a two-story building with a total of 840 m^2 of floor space divided up for use as classrooms for instruction in mine safety, mine operations and mine excavation and general and mining electrical engineering and automatic and remote control laboratories equipped with modern equipment, working models, stands and training simulators. Out on the combine grounds are a mine machine operating range, a training drift, a training longwall and a mine lift building. All practice areas and laboratories are provided with modern operating equipment such as, for example, the VAV automatic water drainage system, the PK-3m tunnelling combine, the 1PPN-5 rock loader, the AShChN shield tunneller and the 2BM-2000 lift. We train our seismic forecasting specialists in a special laboratory equipped with oscillographs, frequency meters, tape recorders and a ZUA-4, which makes it possible for us to avert the danger of blowouts.

Our practice areas and laboratories allow us to offer our trainees practical laboratory experience in the operation of tunnelling machines, excavation combines, rock loaders and the lift. We also organize meetings between our students and veteran miners and production leaders.

The training combine and its branches train and retrain over 3000 students each year, provide advanced training to some 6000 and run introductory mine safety courses for approximately 10,000 students. The combine is staffed by instructors and on-the-job training supervisors selected from among our experienced, highly qualified engineering and technical personnel, who develop not only the skills and knowledge of their students, but their pride in their vocation as well. There is an important political-education component to this program as well.

Our program of training and instruction and extensive utilization of modern training aids (motion picture and slide projectors, video tape recorders, color television, tape recorders) is yielding good results. For the benefit of our newer instructors and to facilitate exchanges of experience we organize open demonstration lessons.

Workers also receive instruction in the theory underlying practice in their selected vocation. A great deal of attention is given to the study of safe work methods and procedures. Upon completion of their work at the training combine, trainees are sent into the mines, where over a period of two more months they complete their mastery of their vocation at the work place itself under the direct supervision of experienced instructor-miners. They then take their final examinations and earn the right to work independently.

The association also runs five mine vocational-technical schools, which train workers for the mines from among graduates of general education schools. Graduates of secondary schools receive one year of training, those who have completed eight years 3.5 years. In addition to instruction in their vocation, the association schools provide these young people the courses they need to complete their 10-year program. Vocational-technical school graduates comprise 15 per cent of our total work force. An instructor-worker trains and monitors the work performance of graduates of this program.

Let us point out here that only people who have at least one year's experience underground are permitted to work on seams which pose the danger of coal and gas blowouts, while those who have no previous mine experience are sent first to safe seams and then only after at least a year to the more hazardous ones.

In addition to questions concerning our worker training programs, the association needs to give a great deal of attention to the need to mechanize the extraction of coal on our steep seams. Our 1984 plans call for fully mechanized longwalls to account for 2.2 million tons of production (that is, to raise this proportion to 31.2 per cent as compared with the 29.2 per cent achieved in 1983). The association will have 40 fully mechanized longwalls on stream. Organizational-technical plans have been outlined to increase production efficiency and satisfy standard workloads assigned each mechanized complex. Ten fully mechanized longwalls have a load of 250-400 tons. Steps have been taken to prepare and bring new fully mechanized longwalls on stream in 1984.

The preparation and operation of our working faces is checked daily. Steps have been taken to bring our manpower strength up to planned levels. Improvements in the quality of scheduled preventive maintenance and steps taken to bring our staff of mechanics up to strength and to supply our fully mechanized longwalls with the air, empty cars, power and materials they need have enabled us to reduce our idle-time. The association receives weekly reports from mine supervisors and section chiefs, analyzes the causes of unsatisfactory performance, outlines steps to remedy deficiencies and checks daily on the implementation of decisions.

Implementation of the measures we have outlined here will make it possible for the association and its mines to improve the use they may of their mechanized complexes, increase the production expected of each working face and in so doing to meet all plan targets. This will require assistance to our enterprises on the part of scientific research and planning and design institutes and organizations. Effort needs to be devoted first and foremost to the problem of mechanizing operations involved in preparing our assembly and installation areas. In a number of instances it is taking 1-1.5 months to work out a stall and two months or more to prepare an assembly and installation area, to include all the antiblowout measures required. We are still lacking mechanized supports for our coal-release and ventilation furnaces and efficient methods of mechanizing assembly-installation-disassembly operations.

Our mine machine-building plants needs to increase their production of tunnelling shields and hydraulic supports as well as all the spare parts for them. To implement the 1984 program, association mines are going to have to take delivery of 18 tunnelling shields and 6 KGU hydraulic lifts; funds allocated to date will meet

58 per cent of this requirement. We face a similar situation with our spare parts requirement -- we have been able to satisfy only 83 per cent of the need.

The introduction of full mechanization at Artemugol' Association mines is going to make it possible for our miners to meet planned coal production targets as well as the objective of achieving an additional 1 per cent increase in labor productivity and a 0.5 per cent decrease in production costs (as compared with plan targets).

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PROCEEDINGS OF COAL WORKERS UNION CENTRAL COMMITTEE PLENUM

Kiev UGOL'UKRAINY in Russian No 7, Jul 84 p 3

[Article by N. I. Borychev, engineer, USSR Ministry of the Coal Industry: "7th Plenum of Coal Industry Workers Union Central Committee"]

[Text] The 7th Plenum of the Coal Workers Union central committee met in Moscow April 13, 1984. The plenum discussed two questions:
- the tasks of union committees in coal industry enterprises and organizations following from decisions of the February (1984) CPSU Central Committee plenum as well as from the theses and conclusions contained in addresses to the plenum by K. U. Chernenko, general secretary of the CPSU Central Committee, and in his remarks to voters;
- the current state and ways to improve safety, working conditions and medical and health services for workers at enterprises under the jurisdiction of the USSR Ministry of the Coal Industry.

M. A. Srebnyy, chairman of the coal industry workers union central committee, spoke to the first question. He reported in the course of his remarks that the highest production figures had been turned in by the Donetskugol', Gukovugol', Krasnoarmeyskugol', Novomoskovskugol' and Yakutugol' associations. The Donetskugol' Association's M. Gor'kiy mine has fullfilled its plan for the first four years of the Eleventh Five-Year-Plan period ahead of schedule. At the same time, however, there are a number of associations which have not fulfilled coal production and labor productivity plans.

V. D. Slyudennikov, director of the Shakhterskantrantsit Association's Vinnitskaya mine, reported on his collective's operation. Thanks to the introduction of full automation and the automation of production processes, as well as to the modernization of the organization's mining equipment, the amount of manual labor miners here have to perform has been substantially reduced. The mine is looking to the new and the most advanced for its facilities. There are still, however, no complexes for development workings.

A. Z. Marinov, trade union committee chairman at the Donetskugol' Association's M. Gor'kiy mine, reported that his collective had met its annual coal production target on April 7, 1984 and had undertaken the obligation to produce another 110 thousand tons of coal over and above that. At the same time the miners assumed the obligation as well to increase labor productivity another 1 per cent and reduce coal production costs 0.5 per cent. Also participating in the discussion

were, among others, N. N. Andreyev, chairman of the Inzinskiy territorial union committee, and I. I. Sumenkov, union committee chairman at the Novomoskovskugol' Association's Sokolovskaya mine.

The plenum adopted a comprehensive resolution on this question. Among other things, it suggested that trade union committees and production organizations undertake an analysis of performance results for the first quarter of 1984, develop and implement a program of specific measures with the objective of helping collectives which have fallen off the pace and closely and continuously monitor progress in the fulfillment of plans and obligations.

Speaking in connection with the second question were V. D. Nikitin, first deputy minister of the USSR coal industry, and A. F. Belousov, secretary of the trade union central committee. The USSR Ministry of the Coal Industry has prepared and approved a program of organizational and technical measures aimed at improving mine safety conditions. This detailed program has made it possible to reduce the number of miners working under hazardous conditions as well as the number of injuries. A great deal of attention is being given to the development of open-cut mining.

Enterprise modernization accounted for 74 per cent of all capital expenditures in 1983. Steps are also being taken to modernize equipment. Obsolete machines and equipment of more than 100 descriptions have now been removed from production operations. But we are still encountering difficulties which keep us from being able to improve mine working conditions as expeditiously as would be desired: gas contamination of our workings, increases in temperature associated with transitions to lower-lying beds etc. A program of measures has accordingly been outlined to improve health and safety conditions in coal industry enterprises.

Trade union committees and the mining inspectorate are giving a great deal of attention to monitoring work safety conditions as well as to efforts to publicize new thinking and enterprise practices which have proven effective in reducing accidents and the disease rate among miners.

M. P. Vasil'chuk, first deputy chairman, USSR Gosgortekhprom [State Committee on Mining Inspection and Supervision of Safe Work Practice in Industry], spoke of the need to tighten technical discipline among technical and engineering personnel at a number of mines and pits with the aim of preventing violations of safety regulations.

O. A. Kolesov, director of the Makeyevskiy Scientific Research Institute of Work Safety in the Coal Industry, addressed the plenum on work practice at the leading longwall operations. Also participating in the discussions were V. Ya. Lukashev, the trade union central committee's chief engineering inspector with the Krasnoluchskiy territorial trade union committee, A. I. Subbotin, director of the Vorkutaugol' Association's Vorgashorskaya mine, and others.

The plenum adopted the appropriate resolution.

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THIN SEAM WORKING TECHNOLOGY DISCUSSED AT DONETSKUGOL'

Kiev UGOL'UKRAINY in Russian No 7, Jul 84 pp 12-14

[Article by A. V. Kurilin, engineer, Donetskugol' Association, and V. I. Safonov, candidate of technical sciences, Uglemekhanizatsiya Scientific-Production Association: "Proposal for Working Thin Seams at Donetsk Mines Outlined"]

[Text] The Donetskugol' Association works are among the oldest in the Donbass. Seams less than 1 m thick contain roughly 60 per cent of all industrial reserves. Geological conditions and the location of the workable seams pose difficulties here, considerable difficulty in a number of mines. Wall rock for the most part is clay shale of medium rigidity with substantial areas of false roof.

Many mines here present a complex tectonics in the form of geological dislocations by folding; there are considerable areas of low-amplitude tectonics where seams have been eroded by water. The cutting resistance of the coal varies between 0.8 and 3.5 kN/cm. More than 40 per cent of the mined beds pose the danger of sudden blowouts of coal, rock and gas. The working depth here averages some 700 m, although in eight mines it reaches more than 1 km. Association mines number 208 working faces in the various ranges of seam thickness, which includes 53 with fully mechanized complexes (Table 1).

The association has almost completed the mechanization of operations on seams 1-1.2 m thick. The KM-88 and KM-87$_{ump}$ complexes (standard size I) are operating efficiently. Operations on the 3d west and 3-bis west longwalls of seam c_{10}^{2} at Yuzhnodonbasskaya mine No. 1 by KM-88 complexes yielded stable daily loads of 1000-1100 tons in 1983. If conditions do not permit efficient use of these complexes we go to the 2K-52m and 1K-101 combines with the individual support. Of 25 longwalls, 9 have been provided with mechanized complexes, 16 with individual-support combines, where the average daily load is running to 300-400 tons.

For the sake of clarity and simplicity of analysis it would be to practical advantage to divide the working seams here into two categories on the basis of thickness — those less than and those more than 1 m thick. Seams in the first category contain 59.5 per cent of the commercial reserves of coal, while 116 stopes supply only 32.8 per cent of the annual volume produced by association mines; in the second category is concentrated 40.5 per cent of the reserves, with 92 stopes producing 67.2 per cent of the coal.

Despite the substantial improvements in the design of our mining machinery overall, the mechanization of the extraction of coal from seams less than 1m thick remains in most instances a problem, particularly in the case of seams less than 0.7 m thick. Work on the development of the 1KM-103 complex has yet to be completed. While engineering specifications show it capable of working seams down to 0.7 m thick, the limit for all practical purposes is 0.75 m. The KD-80 complex has been designed for use on seams 0.85-1.2 m thick, but plans so far call for the fabrication of only an initial test series of these machines. The narrow MK-67 and 1K-101 combines (with individual mechanized supports) can be used on longwalls without cutting the wall rock with minimum seam thicknesses of 0.8 and 0.85 m respectively. Design and engineering limit the application of the UST-2m and US-2u (US-3) slicer and scraper-slicer to certain cutting resistances of the coal and to areas in which the roof can be exposed without support along the entire length of a longwall to distances of 1.8 and 1.6 m from the face.

Table 1

indicator	seam thickness, m					
	<0.5	0.51–0.7	0.71–1	1.01–1.2	1.21–1.8	>1.8
No. working faces	3	57	56	25	62	5
% total production	0,8	11,5	20,5	15,4	48,8	3

The new-generation K-103 combine, which can work seams down to 0.5 m thick on longwalls with an individual support, can at the same time be used only in areas with stable roof rock, what with the fact that the design and the width of this combine together with the equipment mounted on the SP-202V scraper conveyor require an unsupported area at the face more than 2 m wide along the entire length of the longwall. This much unsupported area is permitted in association mines in only a very limited number of cases in working the k_8 seam, whose roof contains rigid limestone with a continuous sag.

The broad-cut Kirovets and KTsTT combines are not efficient and frequently stand idle because of failures; they are periodically removed from production operations and remanufactured in smaller series with a limited supply of spare parts.

All these factors help account for the variety of machines the association employs in its mines to work seams 1 m thick and less as well as for the varying loads per working face (Table 2).

Table 2

indicator	1K-101	Kirovets	UST-2m US-2u	KTsTS
Number of working faces	24	50	25	10
Av. daily load/ working face, t	264	135	158	122

Association mines can be divided into two categories on the basis of the thickness of the workable seams: mines with both thin seams and seams of medium thickness and those with only thin seams.

Taking account of the existing technical-economic base (lift capacity, manpower, number of working sections, loads per working face, labor productivity etc.), mines in the first category will ordinarily prefer to work seams at least 1 m thick. Only under favorable geological conditions will they work seams down to 0.85 m thick, conditions permitting use of the 1K-101 combine. As a rule, the commercial reserves in the thinner seams in these mines will remain unworked. At the Zasyad'ko mine, for example, seams more than 1 m thick have been worked down to 1 km. Work is now underway to deepen shafts and develop a level at 1078 m. At the same time, large reserves are concentrated at a higher level at 529 m in seams k_5, k_5^1, l_2^1, l_3, l_7 and l_8, which run 0.5-0.7 m thick. The thin to very thin seams are heavily worked (which frequently involves cutting into the wall rock) when they become obstacles to efforts to open up and develop thicker seams. We could look at Yuzhnodonbasskaya Mine No. 1, for example, where we are working three adjacent seams, the uppermost of which, c_{13}, is 0.6-0.65 m thick.

The Kirovskaya, Lidieyevka, Mushketovskaya, Krasnaya zvezda, Mospinskaya and Pravda mines, all mines which have been worked for some time now, have either had their thicker seams mined out at some earlier period or contained none at all in the first place. Existing equipment now working in these mines produces an average daily load per face of no more than 200 tons, while average monthly production per miner is somewhere in the vicinity of 20 tons. If we cannot begin to exploit the thinner seams in these first-category mines more intensively, they can at some point in the future start to drag down our technical-economic indicators.

Since reserves in the heavily worked seams 0.8 m thick and more are gradually being exhausted, the association's mine development plan calls for almost a doubling of production from the thin to very thin seams. Without high-efficiency machines and the introduction of practicable new methods of extraction it is going to be difficult to keep production levels from falling and to be able to work these thin to very thin seams with any degree of efficiency.

Experience in developing and working the 0.5-0.7-m seams shows that, as a rule, the working conditions are favorable there as far as roof rigidity is concerned. For the most part, the coal here is good for coking; it a low-ash coal containing little sulfur. It is very difficult to extract, however, so production levels are extremely low. Industry institutes are not giving enough attention to the problems involved in working these very thin seams. New methods we see proposed for working the 0.5-0.7-m seams are occasionally only theoretical in nature and offer no possibility of practical implementation. To all appearances it looks as though we are not going to see any high-efficiency mechanized systems developed to work these seams.

Coal is now being mined from very thin seams with series-manufactured complexes by cutting into the wall rock at some 200 faces in the Donbass. Most mines, however, do not have their own concentrating mills, so to transport mining production to some central shared concentrating facility generates substantial increases in overall costs, not to mention the unwarranted extra burden this places on the railroad. The accumulation of additional volumes of rock on the surface not only entails added expenditures, it degrades the environment as well. If we left this rock in the mine and used it to fill in areas as they are mined out it would solve

a great many problems in addition to the one of how to mine out our thin seams. But since we now have no efficient means of working these seams, we are paying to leave this material in the mines in the form of higher labor and materials inputs as well as of increased coal production costs.

Improvement of our fully mechanized operations is a promising direction in which we should — it would bring qualitative improvement, in turn, in both the technical-economic and social factors involved (concentration of mining operations, labor productivity, coal production costs, work safety conditions etc.). If, however, we continue to work these extremely thin seams with machinery at the present stage of development these problems are going to find no real practical solution.

Given the present state of development of our mining operations and of efforts to improve these procedures in connection with the extraction of commercial reserves in very thin seams, it is our view that we should move ahead with the modernization and development of the broad-cut Kirovets and KTsTG combines and improve the reliability and quality of individual components. Without introducing any fundamental modifications of the mechanics or engineering going into these machines, we can and should use smaller but higher-power cooled engines, which will make it possible for us to break up extremely hard coals (those with cutting resistances of 3-3.5 kN/cm).

The bar and the cutting and loading chains on the Kirovets combine have to be made more reliable and less prone to failure, and when we use a more powerful engine we are going to have to strengthen the gearing. The business end of the KTsTG combine (the cutting bits), too, has to be more reliable. We are also going to have to solve the problem of mechanizing the process of turning the combine around when it gets to the end of a longwall. With the present design, 30 per cent of the time required to complete a single cycle goes into turning the combine around. The modernization of these combines may also require the parallel development of a flexible conveyor system.

The need for improvement is dictated by the fact that at Donetskugol' Association mines alone these combines are producing 2.6 million tons of coal a year from very thin seams, and the future is going to see this figure exceed 5 million tons.

Implementation of these measures will initially make it possible to maintain the current level of coal production at Donetskugol' Association mines and then gradually to raise this level by working reserves in the 0.5-0.7-m seams. This does not, however, eliminate the necessity of continuing our efforts to develop new machinery and nontraditional methods of extracting and transporting coal from thin and very thin seams.

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NEW MINING MACHINERY DESCRIBED

Kiev UGOL' UKRAINY in Russian No 7, Jul 84 pp 15, 25, 27

[Article: "New Mining Equipment"]

[Text] The Shakhtinskiy branch of the Novocherkassk Polytechnical Institute has developed a pneumatic ejector for removing sludge from stopes. The ejector is a pump which moves sludge or other solid material with a jet of compressed air. An intake is lowered into a pit or drainage ditch containing the sludge such that the opening is below the level of the sludge. Compressed air from a line running through the stopes feeds through a flexible hose and an intake pipe into a circular chamber, through an opening in which it flows at high speed into a mixing chamber and lowers the pressure in it. Atmospheric pressure raises the sludge to the mixing chamber, where the jet of compressed air imparts kinetic energy sufficient to move it further. The mixture of air and sludge thus formed now flows to a conveyor, a car or via a flexible hose connected to the pipe to another receptacle.

The Rostovugol' Association's Mayskaya mine is using these ejectors in the process of cleaning coal which spills at points of transfer from one conveyor to another.

Avtomatuglerubprom has developed a speed limiter (OSP) to prevent underground lifts from exceeding permissible speeds. The limiter, made especially blast-resistant to be installed in underground areas, consists of two independent lines fed from a nonsparking source. Each line contains a pulsed path-control transducer mounted on the lift, which converts the rotation of the drum to a sequence of electric pulses. The limiter generates a voltage and an instruction to begin braking the lift if it exceeds authorized speed. An indicator unit contains two devices for establishing the speed of the lift and two indicator lights identifying the location of the lift within the shaft.

Avtomatuglerudprom has also developed a sensor for automatic detection of sudden blowouts of coal and gas in a mine and then for signalling the occurence of a blowout. The sensor consists of a housing, a primary pressure converter, an electronic time-delay circuit and a power source. The housing is divided into two chambers. A sealed chamber with diaphragm and fluidic resistor is the primary pressure converter with adjustable actuation threshold. The other chamber contains the electronic circuit, power source and terminal block for external connections. The chamber has two telephone-cable inputs.

Blowouts of coal and gas generate air shock waves, which in turn produce sharp increases in pressure inside a mine. This pressure sets the diaphragm with its rod in motion, closes the contacts on the sensor's primary pressure converter and applies power to the electronic circuit. The circuit then actuates the output contacts, which in turn switch on the circuits of the automatic detection and warning system in the mine.

The special bureau for designing and engineering automatic mine equipment has developed a stand for independently checking, adjusting and repairing basic components and working assemblies on the series produced TKU-2 and PPT-1. The stand can also be used as a simulator for training service personnel.

In the case of the TKU-2 it checks the two positional control commands, the state of the controlled objects by means of a simulator, the transmission of remote measuring signals with the remote measuring simulator sensor and the operation of the functional components of the device, adjusts the receiver and transmitter of the target being monitored to distances of up to 10 km as well as all associated equipment in accordance with manufacturer's specifications, simulates fluctuations in supply voltage and searches for malfunctions by means of a diagnostic device.

On the PPT-1 the stand can be used to check the transmission of telemetry signals and telemetry information when the controlled objects being monitored are powered from a single power circuit and the operation of basic components by substituting identical ones incorporated in the stand and adjusts the device in accordance with manufacturer's specifications.

The stand has undergone production testing and is now in service in ASUugleavtomatika's Donetsk Special Installation and Adjustment Administration.

The special bureau for designing and engineering automatic mine equipment has also developed a staged dust collector (BTsU-S) designed to remove solid particles (ash and dust, for example) from gases (air). The BTsU-S improves on the design of the BTsU multicyclone systems, which have performed well as ash and dust collectors in boiler and concentration facilities.

The BTsU-S dust collector consists of a number of rows of cyclone components arranged both parallel and perpendicular to the flow of the gas, which enters via a semihelical intake.

The arrangement of these elements in stages improves the distribution of the gas between them and raises the dust-trapping efficiency of the device. The covers on the intake pipes of the cyclone elements have been extended into the purified gas chamber to prevent any dust from settling out. The design of this cyclone makes for easier maintenance and replacement of worn components. The BTsU-S is compact and weighs 300 kg.

The Tula Polytechnical Institute has developed a profile recorder designed to provide continuous strip-chart recordings of surface profiles on load-bearing components (beams, barriers, foundations) of mechanized supports. The device consists of an N-37 direct-conversion recorder bridge, a sensor, consisting of a guide (standard) and carriage with potentiometer and a spring-loaded drum.

The guide can be a rectangular or round tube or taut wire. As the carriage moves along the guide it measures and records deviations of points on the surface of a load-bearing structure from a straight line.

The use of this profilograph makes it possible to detect residual deformation for timely replacement of components during assembly and installation and collect data on structural loads.

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UDC 553.94.044(477.61/.62):622.01

ADDITIONAL WORKABLE COAL RESERVES IN SOUTHWESTERN DONBASS

Kiev UGOL' UKRAINY in Russian No 7, Jul 84 pp 38-40

[Article by N. P. Ochkur, candidate of geological and mineral sciences, and V. I. Chizh, engineer, Artemovskaya State Regional Power Plant: "Additional Workable Coal Reserves in the Southwestern Donbass"]

[Text] An important way we have of increasing available coal resources in the Donbass is to make fuller use of balance, nonbalance and uncounted reserves in our working mine fields. This article is being written with the objective of encouraging timely, economically sound exploitation of our thin and high-ash seams. The high proportion of thin seams in our reserves is the result first and foremost of a disparity between seam thicknesses identified during exploration and the capabilities of present-day mining machines. This has in turn led to a situation in which these seams comprise a declining proportion of our mined-out workings. The degradation of Donbass coal resources can be attributed to the practice of working reserves at depths closer to the surface and (in previous years) at medium depths and the most productive seams in still unworked sections. These are still the seams most intensively worked at lower-lying levels.

The structure of our coal reserves is degrading because of an increase in the proportion of what are referred to as "inefficient" seams. Each passing year sees unexploited reserves relegated in increasing volumes to the category of those to be worked at some unspecified time in the future, a substantial proportion simply written off for one reason or another and frequently lost irrevocably. Selective exploitation of our coal seams ultimately shortens the life of our mines and increased capital expenditures to prepare new beds and build new enterprises to maintain current production levels.

Analysis of the availability and exploitation of coal resources in Donetsk Oblast mines has shown that in addition to the workable reserves, a substantial proportion (22.5 per cent) comprises substandard coal resources in very thin seams as well as reserves disregarded during exploration (as much as 4.5 per cent, a figure which would include uncomputed areas within a seam, in areas of tectonic wedging and dislocation etc.).

We are working both standard (in thin seams) and substandard reserves where coal resources are running short (Chistyakovo-Snezhnyanskiy Rayon) as well as in a number of mines in Donetsko-Makeyevskiy and Tsentral'nyy Rayons. Substandard

reserves are worked more intensively here than in rayons where this deficit is less serious.

The statistical indicators determining whether reserves are assigned to the category of resources vary, thicknesses between 0.45 and 0.7 m, ash contents between 30 and 50 per cent, for example, which is explained by the varying engineering economic indicators obtained in different areas of exploration, on the basis of the optimization of which are established the varying qualities represented. It would be to economic advantage, for example, to concentrate material with ash contents ranging between 55 and 60 per cent, but for all practical purposes this coal is not be mined because of the inadequate processing capacities of the concentrating mills.

Substantial fuel reserves (22.5 per ent of the total) in Donetsk Oblast have been hidden in with the resources; over half of this amount is coking coal, roughly one-fourth of which is concentrated in working mine fields. Most of these reserves have been relegated to the category of resources because of seam thickness (74.2 per cent), the rest because of ash content (10.6 per cent) and geological conditions (15.2 per cent). Resources in this category as a proportion of total resources reach a characteristic maximum in Donetsko-Makeyevskiy and Krasnoarmeyskiy Rayons (33 and 27.8 per cent respectively) and a minimum in Yuzhnodonbasskiy Rayon (16,1 per cent). Most of these resources are concentrated in Torezantratsit Association (30.1 per cent) and Ordzhonikidzeugol' (32.1 per cent) mines.

Donetsk Oblast mines are currently exploiting their substandard reserves. In 1981, for example, production from substandard seams reached 11.5 per cent, while plans for 1985 call for this figure to run between 10 and 11 per cent, 24 per cent of this volume coming from seams substandard because of thickness, 61 per cent due to ash content, 15 per cent comprising resources disregarded in the computation of reserves. Let us look now at cases in which resources worked figure into overall production figures.

CRITICAL SHORTAGES OF COAL RESOURCES IN A RAYON. The years 1980-1985 are going to see one-fifth of overall mine capacity eliminated in Chistyakovo-Snezhnyanskiy Rayon because of the exhaustion of reserves here, and there is no prospect that resources can be increased through exploration at medium depths. So coal reserves in difficult seams which have been assigned to the category of resources because of their ash content are now being worked for production to extend the life of individual mines.

It is economically advantageous to work seams with ash contents ranging between 40 and 45 per cent (k_7, Toretskoye; h_3^1, Voskhod mine), this being less true, however, of seams which have been designated substandard because of their thickness (k_1, Chervona zirka). Coal production from substandard seams at Torezantratsit Association mines reached 20-31 per cent during the Tenth-Five-Year-Plan period, 13.5-18 per cent of this production coming from resources category coal. Plans call for the production of 19 million tons of coal from substandard seams in Chistyakovo-Snezhnyanskiy Rayon during the Eleventh-Five-Year-Plan period.

UNEVEN EXPLOITATION OF RESERVES IN INDIVIDUAL MINES IN RAYONS WITH GENERALLY ADEQUATE COAL RESOURCES. Substandard seams are being worked in Donetsko-Makeyevskiy and Tsentral'nyy Rayons and parts of Krasnoarmeyskiy Rayon in situations where the commercial reserves in a mine field have been completely exhausted or where these reserves are temporarily low in a given bed and a new bed has not been prepared in time.

Coal production from substandard seams in Artemugol' Association mines during the years 1976-1980 ran between 7.2 and 17 per cent, 7.2-8.8 per cent comprising production from resource category coal; the figures for Ordzhonikidze Association were 26.1-30.1 and 12-17.6 per cent respectively, 7-9.8 and 4.3-4.8 per cent in Donetsko-Makeyevskiy Rayon (not including the limited reserves of Kholodnaya balka mine) and 1.7-5.2 and 1.3-5.2 per cent for Krasnoarmeyskugol' Association.

VERY THIN SEAMS ARE WORKED AS SHIELDING SEAMS primarily in Tsentral'nyy Rayon and in individual mines in Donetsko-Makeyevskiy Rayon. Let us look at Ordzhonikidzeugol' Association mines in Tsentral'nyy Rayon and Sovetskugol' Association's Kholodnaya balka mine in Donetsko-Makeyevskiy Rayon as examples of the effectiveness of exploiting substandard resources.

Ordzhonikidze Association mines are working 8-17 seams simultaneously with thicknesses ranging between 0.35 (seam k_2^2 at the Bulavinskaya mine) and 2.5 m (seam 1_1 at the Uglegorskaya mine), for the most part between 0.6 and 1.1 m. The coal here requires light to medium concentration and has ash contents of 26-42 per cent. The mines here can be divided into two groups: those where substandard resources are a major factor in production (17.4-23.8 per cent) and those where they do not (3.9-9.6 per cent). Coal assigned to the resource category because of ash content constituted 6.9-11.4 per cent of Tenth-Five-Year-Plan production, that so categorized because of seam thickness 2.1-8.5 per cent and coal in the resource category due to geological conditions 2 per cent of production.

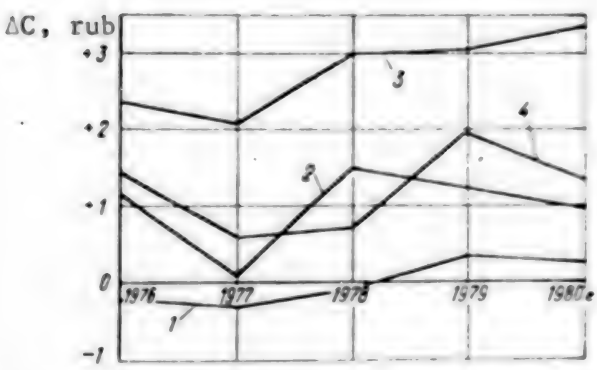

Figure 1. Annual variations in sectional costs per ton of coal Δ (minus = decline, plus = increase) with the working of substandard resources: 1 - with respect to ash content; 2 - thickness; 3 - geological conditions; 4 - resources from uncomputed areas.

With only a slight increase in total production from substandard resources from 25.8 per cent in 1976 to 28.7 per cent in 1980, overall coal production costs rose 33 per cent, which refutes the assumption that this increase is due to degradation of the working seams.

The economic consequences of working substandard resources can be seen more clearly with a look at the dynamics of sectional costs (Figure 1).* Comparison of per-ton coal costs shows that it is more economical to

* L. P. Il'ina helped with the analysis of the data presented here.

work coal which has been assigned to the resource category on account of ash content than that in this category due to seam thickness. For the years 1976-1978, for example, the cost of one ton of coal produced from these resources was 0.09-0.32 rubles lower, but during the period 1979-1980 0.29-0.34 rubles higher, than coal produced from standard-quality reserves, while at the same time the cost of producing coal in the resource category due to seam thickness was 0.12-1.48 rubles per ton higher in all years under consideration here. Overall, the sectional cost of mining substandard resource-category coal exceeded the cost of extracting quality reserves by an average of 11.3 per cent, this figure dropping as low as 4.8 in 1977 and rising as high as 15.8 per cent in 1979. Resource coal constituted 37.6 per cent at the Kholodnaya balka mine on January 1, 1982. During the period 1976-1980 this coal accounted for 50.7-74.6 per cent of total production. Six to eight seams of the C_2^5 series have been worked. The relatively uniformly structured seams varied in thickness between 0.45 and 0.8 meters, a number of them (k_3^B and k_4^H) converging to form a single composite seam 1.06-2.05 m thick and inclined at angles of between 2-3 and 25-28°. The surrounding rock is for the most part solid and of medium rigidity.

With the extraction of substandard resource coal during the years 1976-1980, overall coal production costs rose 28.2 per cent, the same being true with the working of reserve coal as well, this due primarily to the deterioration of geological conditions. Per-section costs of producing reserve coal rose 46.6 per cent, this figure rising to 61.5 per cent in the case of coal assigned to resource category because of seam thickness. With the working of resources from uncomputed areas, sectional coal production costs rose 15 per cent.

Computation and analysis (using the procedure employed by TsNIEIugol' [Central Scientific Research Institute of Coal Industry Economics and Scientific and Technical Information]) of the effectiveness of working substandard resources during the Tenth-Five-Year-Plan period by the Ordzhonikidzeugol' Association and the Kholodnaya balka mine has proven the economic advantage of mining this coal. Average annual gains ran to 10.8 and 2.6 million rubles respectively, these gains to be attributed primarily to reductions in amortization allowances and increases in production loads assigned to each mine. To bring substandard resources into production degrades the quality and grade of the coal extracted and inflicts heavy average annual losses (3.8 million rubles in the case of Ordzhonikidze Association, 8.9 million rubles for the Kholodnaya balka mine). But in situations in which we face serious shortages of coal resources at medium depths in these rayons, and in view of cuts in capital expenditures for new mine construction, we should be working both our reserves and our substandard coal, that is, our resource-category coal and coal in areas left uncomputed. Let us point out here that the Eleventh Five-Year Plan calls for coal in these categories to be mined at the same levels: 30.5 per cent for Ordzhonikidze Association in 1983, for example (16.3 per cent resource-category coal, 14.2 per cent coal from uncomputed areas), 78.9 per cent for the Kholodnaya balka mine.

So, to extend the life of our mines, increase yields on capital and reduce shortages of workable fuel resources in the Donbass it would be to economic advantage to increase production of resource-category coal to levels coinciding with the proportion it constitutes of resources overall. We can improve the technical-economic indicators of areas which have already been explored and at the same time make fuller use of the mineral resources available to us with more efficient exploitation of coal in both reserve and resource categories.

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SYNOPSES OF ARTICLES IN UGOL' UKRAINY, JULY 1984

Kiev UGOL' UKRAINY in Russian No 7, Jul 84 p 48

UDC (622.261+622.281):622.234.5(477.61/.62)

TEMPORARY WORKINGS AND ASSOCIATED SUPPORTS IN DONBASS HYDRAULIC MINES

[Synopsis of article by N. N. Krupin, M. I. Papkov and H. I. Dikiy, pp 14-15]

[Text] The authors describe the operation of temporary workings in hydraulic mines. Drawbacks associated with shortwall operations. Technical, engineering and organizational suggestions for increasing the efficiency of temporary workings.

UDC 622.013:622.26

FACTORS AFFECTING THE LABOR INTENSITY OF PRODUCTION OPERATIONS

[Synopsis of article by V. A. Karamzin, pp 16-17]

[Text] The author discusses the effect of various factors influencing the structure of the labor inputs associated with preparatory combine operations. Quantitative and qualitative characteristics of labor expenditures and the most effective ways to reduce them.

UDC 622.33:622.73:33.003.13

THE EFFICIENCY OF CAPITAL INVESTMENT IN ENGINEERING ECONOMIC CALCULATIONS

[Synopsis of article by I. G. Roshchupkin, pp 17-18]

[Text] The author discusses a procedure and formula for computing investment efficiency in planning primary mine production parameters. Standard efficiency values for mines with projected capacities of 1.2-6 million tons per year and commercial reserves of 60-250 million tons. Recommendations. 1 Table.

UDC 622.01:658.314.72

ALEKSANDRIYAUGOL' ASSOCIATION INNOVATORS

[Synopsis of article by V. S. Libova, pp 18-19]

[Text] A number of suggestions for improving efficiency introduced during the period 1981-1983 at Aleksandriyaugol' Association mines. 5 illustrations.

UDC 622.272.633:622.232.72-52

THE AUS-KV CONTROL SYSTEM FOR MACHINERY MINING BLOWOUT-PRONE SEAMS

[Synopsis of article by B. Ye. Yarygin, L. A. Vaynshteyn, A. G. Khimenko and E. G. Pekhovich, pp 20-21]

[Text] Organization and results of mine tests of AUS-KV system for remote control from a safe distance of mining machines operating on seams posing a blowout danger.

UDC 622.625.28-83:681.178

UPN DEVICE FOR DETECTING MALFUNCTIONS

[Synopsis of article by A. I. Kulinich and V. N. Chernyavskiy, p 21]

[Text] UPN used to detect malfunctions in electronic components of control system of TERA-1, operation, mine tests. 1 illustration.

UDC 622.53:621.67.004.14

EXPANDING THE RANGE OF APPLICATION OF MULTISTAGE PUMPS IN COAL MINES

[Synopsis of article by N. A. Bogomolov and V. A. Romanov, p 22]

[Text] Possibility and recommendations for mutual replacement of multistage sectional centrifugal pumps in mine drainage systems. 3 tables.

UDC 622.807.4

PUMPS FOR PREVENTIVE APPLICATION IN SEAM TREATMENT

[Synopsis of article by Ya. D. Reka, A. I. Olifirenko and Ye. A. Mufel', pp 23-24]

[Text] Design, operating principle and results of production tests under mine conditions of UNG pumps based on a general-purpose pump and designed to force water into a seam to settle dust and degas. 2 illustrations.

UDC 622.285.822

WAYS TO EXTEND THE LIFE OF 1M-88 SUPPORT COLUMNS

[Synopsis of article by P. Ye. Semik, N. A. Sklyarov and Yu. S. Panchekha, pp 24-25]

[Text] Results of flaw analysis on 1M-88 hydraulic support columns. Analysis of the composition of contaminants of working fluids. Recommendations for extending column life. 3 illustrations.

UDC 622.6:656.2:658.58.35

IMPROVING STsB MINE EQUIPMENT

[Synopsis of article by V. V. Kiyko and I. S. Margulis, pp 26-27]

[Text] Sparkless noncontact automatic remote system for controlling signal lights and switches on mine railroads with information output to underground dispatcher. Possibility of effective centralized response. KUVET equipment tested at Intinskaya mine. 1 illustration.

UDC 622.673.1:62-78

MINE TESTS OF ARPT SYSTEM FOR NEW DOUBLE-DRUM UNDERGROUND KNMZ MACHINES

[Synopsis of article by I. P. Kovalevskiy, V. K. Maksimenko and S. N. Shapochka, pp 28-30]

[Text] Special features of ARPT system for new double-drum underground KNMZ machines with results of system mine tests and recommendations for application. 2 illustrations.

UDC 622.647.21

TRANSPORTING BULK MATERIALS BY DEEP-TROUGH CONVEYOR

[Synopsis of article by Ye. Kh Zavgorodniy, V. I. Morev and A. S. Romashkin, p 30]

[Text] Experimental studies. Empirical formulas and recommendations for the application of smooth-belt deep-trough conveyors with increased angles of incline (up to 25°).

UDC 622.012.2:621.311.002.5

MAIN TYPES OF DAMAGE AND FAILURE 1140 V ELECTRIC MINING EQUIPMENT

[Synopsis of article by M. I. Makarov and V. I. Gruzdov, pp 31-32]

[Text] Analysis of failures of 1140 V electric equipment. Data on average time and labor required for repairs and most reliable components of the equipment. 2 tables; bibliography: 1 entry.

UDC 621.313.333-213:34.019.3:622.5

RELIABILITY OF VP250-280 ELECTRIC MOTORS IN PUMP DRIVES

[Synopsis of article by B. N. Vaneyev, V. M. Gostishchev and N. G. Sukhorukov, pp 32-33]

[Text] Analysis of reliability of VP250SR and 280SR electric motors used in coal mine drainage pumps (at least 20,000 h between failures, an average of at least 30,000 h until first major overhaul). 1 illustration.

UDC 622.02:531:622.831.3

THE GAS-DYNAMIC STATE OF A STEEPLY-INCLINED SEAM IN A SINGLE WORKING

[Synopsis of article by D. M. Zhitlenok, p 34]

[Text] Nature of the change in relief zone around a working due to redistribution of stresses during the working of the face. Factors affecting the nature of the change in the stress-strain state of the formation adjacent to a single working. 2 illustrations.

UDC 622.011:550.83:622.831

ACOUSTIC CHARACTERISTICS OF ROCK AS A FUNCTION OF COMPRESSION LOADS

[Synopsis of article by S. V. Mirer and V. A. Dyakonyuk, p 35]

[Text] Results of studies of frequency-amplitude characteristics of an acoustic signal generated in sandstone samples. 1 illustration.

UDC 622.817.47

DEGASSING SEAMS IN DEEP MINES WITH WELLS

[Synopsis of article by Yu. V. Deyev, V. A. Markin and V. V. Kas'yanov, pp 35-36]

[Text] Results of experimental studies of the effect of the depth of mining operations on the nature of the methane release from the wells and the degree of degasification of working coal seams. Verified relationships recommended for computation. 1 illustration; bibliography: 3 entries.

UDC 622.831.325.3

DETERMINING DEGREE OF SEAM DEGASIFICATION AND GAS RELEASE IN MINE EXCAVATIONS

[Synopsis of article by Kh. A. Bayev, pp 36-37]

[Text] Computation of degree of degasification of contiguous seams and of gas release in the working sections of mines as functions of time and the working of the face. Formulas for use in planning ventilation systems and degasification and antiblowout measures in working sections. 1 table.

UDC (622.831.325:622.234.574):534.2

SEISMOACOUSTIC METHOD OF MONITORING PARAMETERS OF HYDROLOOSENING OPERATIONS

[Synopsis of article by V. N. Puzyrev and A. ' Shadrin, pp 37-38]

[Text] Method of continuous seismoacoustic monitoring of the process of hydroloosening a seam. Coal water-saturated within minimal periods of time. 1 table; 1 illustration.

UDC 553.94.044(477.61/.62):622.01

ADDITIONAL WORKABLE COAL RESOURCES IN SOUTHWESTERN DONBASS

[Synopsis of article by N. P. Ochkur and V. I. Chizh, pp 38-40]

[Text] Working substandard resource-category coal in the southwestern Donbass to extend the life of a number of mines. 1 illustration.

UDC 622.33.013

REDUCING MANUAL LABOR INPUTS IN MINE CONSTRUCTION ADMINISTRATION

[Synopsis of article by V. V. Mironov, G. Ye. Simonov and V. I. Papu, pp 41-43]

[Text] Development and introduction of mechanization designed to reduce manual labor requirements in Donetskshakhtostroy Trust's Mine Construction Administration No. 2. 5 illustrations.

UDC 662.74:622.01

COMBINED INDICATOR OF COAL GRAIN COMPOSITION

[Synopsis of article by N. I. Kalach, p 43]

[Text] Method of analyzing coal grain composition on the basis of a single index. Advantages and drawbacks to this method. 1 table.

UDC 622.741:622.333

CATEGORIZATION OF WET SEPARATION-RESISTANT COAL ON SEPARATOR WITH ROTATING WORKING SURFACE

[Synopsis of article by I. V. Mikhal'kov, pp 44-45]

[Text] Operational principle and specifications of separator with rotating surface. Experimental separator tests by Ukrniiugleobogashcheniye. Range of applications. 1 table; 2 illustrations.

8963
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NUCLEAR POWER

COOPERATION AMONG CEMA NATIONS IN NUCLEAR ENERGY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jun 84 p 3

[Article by A. Motorin, CEMA expert: "Nuclear Power Engineering and CEMA"]

[Text] It was recognized as feasible "to expand cooperation in primary development of nuclear power engineering" in the communique of the High-Level Economic Conference of CEMA Members, held recently in Moscow.

The cooperation of CEMA members in nuclear power engineering began in the mid-1950s, when Soviet specialists began to render technical assistance to fraternal countries in construction of research reactors, cyclotrons and radiochemical and other laboratories. Special scientific research institutes of nuclear physics, which subsequently played a decisive role in training highly skilled national cadres, who did practical work directly at operating nuclear power plants of the Soviet union, were created. More than 3 million kilowatts of power capacities were introduced in the past in the Peoples Republic of Bulgaria, the German Democratic Republic and the CSSR with the technical assistance of the Soviet Union.

The effectiveness of nuclear power engineering in solution of the fuel-energy problem became especially evident during the first half of the 1970s. Although the CEMA members as a whole have enormous fossil fuel reserves at their disposal, production and transport of it has recently become ever more laborious and expensive.

Hydrogenous coal is now mainly used for electric and thermal energy generation in the GDR and CSSR. But as a result of intensive exploitation, the coal deposits, advantageous from the economic viewpoint, have already been depleted to a significant degree. The Peoples Republic of Bulgaria, the Hungarian Peoples Republic and the Republic of Cuba are extremely poor in fuel and energy resources.

Thus, objective conditions have now been established for more fundamental development of nuclear power engineering. This has been reflected in the Long-Term Specific Program of Cooperation (DTsPS) to provide the economically substantiated needs of the countries for the main types of energy, fuel and raw material.

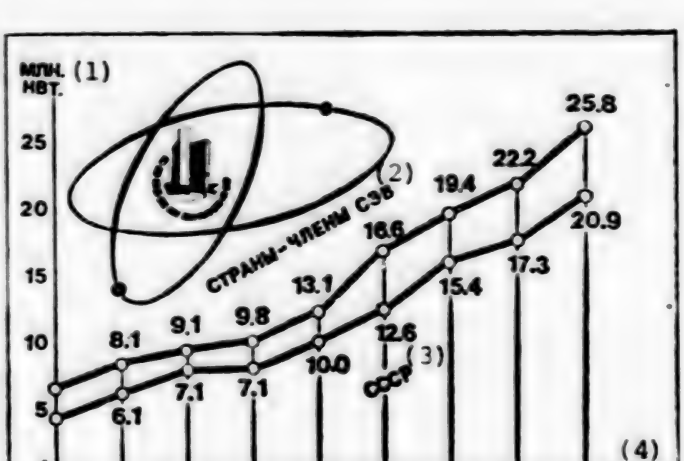
The extensive construction program, adopted in the European CEMA countries and in the Republic of Cuba on the basis of cooperation of nuclear power plant with total capacity of 37 million kilowatts, required fundamental solution of the base of nuclear energy machine building. The problem of creating a new sector arose in practice.

Cooperation and production of equipment for AES now encompasses more than 50 large associations and enterprises of CEMA countries and SFRYU [The Socialist Federated Republic of Yugoslavia]. The large Soviet association Atommash imeni L. I. Brezhnev, which is already delivering reactor units and basic equipment of the primary circuit, occupies a prominent position among newly constructed enterprises. Specialized shops in the Skoda Association, the Vitkovitsy Machine Building and Metallurgical Plant were created in Czechoslovakia. Shops for production of loading machines have been renovated in Hungary at the Gants Mavag plant. Capacities for manufacture of pressure compensators and steam generators have been introduced in Poland at the Rafaco Plant and a modernized shop that produces heat exchangers has been introduced at the Fakop Plant.

One of the forms of multilateral cooperation is construction of large energy facilities by combined efforts. The first of these facilities in nuclear power engineering are the Khmelnitskaya AES with capacity of four million kilowatts, being constructed jointly through the efforts of the Hungarian Peoples Republic, the Polish Peoples Republic, the USSR and the CSSR, and the 750-kilovolt Khmelnitskaya AES (USSR)-Czeszow (Polish Peoples Republic) electric power transmission line, constructed with the participation of the Hungarian Peoples Republic, the GDR, Polish Peoples Republic, USSR and CSSR. The amount of electric energy which each country participating in development of this AES will receive according to agreement is directly proportional to its contribution to construction. Deliveries of electric energy from the USSR to the fraternal countries will double after the Khmelnitskaya AES is brought to full capacity.

The Southern Ukraine AES is being constructed under similar conditions through the joint efforts of the Socialist Republic of Rumania and the USSR and the 750-kilovolt Southern Ukraine AES (USSR)-Isaccea (Socialist Republic of Rumania)-Dobruja (Peoples Republic of Bulgaria) electric power transmission line is being constructed with the participation of the Peoples Republic of Bulgaria, the Socialist Republic of Rumania and the USSR.

Development of nuclear power engineering equipment is an integrated scientific and technical problem that requires the broad participation of many sectors of modern science and technology. High requirements of reliability, safety and economy must be satisfied in development and manufacture of equipment for AES. This can be achieved only on the basis of extensive scientific research work that requires large expenditures. An example is development and introduction of the pilot energy unit with capacity of one million kilowatts in 1980 at the Novovoronezh AES, which comprises the basis of nuclear power engineering for the next 10-15 years. An enormous volume of research to find and organize production of new marks of steel, in development of highly efficient production processes and production equipment and methods and means of



Increase of Installed Capacity at AES in CEMA Countries

Key:

1. Million kilowatts
2. CEMA countries
3. USSR
4. Years

quality control of billets and articles has been completed in design and organization of production of equipment for this plant.

Fruitful cooperation is also being developed in operation of AES, specifically in development of energy units with capacity of one million kilowatts. The coordinated program is directed toward further improvement of this situation, improvement of its technical and economic indicators, a further increase of the level of safety and a reduction of construction periods.

The experience of international economic and scientific and technical cooperation in nuclear power engineering indicates the great vital force of socialist internationalism and multiplication of efforts when they are combined to solve large national economic problems.

6521
CSO: 1822/370

ATOMMASH PROGRESS OUTLINED

Staff Meeting Surveys Progress

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Jul 84 p 2

[Article: "SOTSIALISTICHESKAYA INDUSTRIYA at Atommash"]

[Text] A session of the oblast staff for the installation of projects of the Volga-Don Industrial Area examined progress in the construction of Atommash during the first half of the year. The editorial "Build Comprehensively", published in the "At Atommash" section of SOTSIALISTICHESKAYA INDUSTRIYA No 29 (289) gave a detailed analysis of work by Volgodonskenergrostroy [Volga Don Power Engineering Construction] Trust during this time. More capital investments were used than in the previous plan. Several targets for construction installation work volume were underfulfilled, but this indicator's results were better than for last year. The Zavodstroy collective worked successfully.

However, this paper has repeatedly directed attention to the faster pace building erection at all of start-up compared to other facilities at the site.

Paper Reports Problems

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Jul 84 p 2

[Article: "Every Day at High Pressure"]

[Text] The article "SOTSIALISTICHESKAYA INDUSTRIYA at Atommash" appearing in issue No 30 (290) reported the successes of construction and operations personnel in competition to beat the schedule for completing targets of the five-year plan's fourth year.

Under the rubric "Addressed to Progressive Experience" the paper examined G. Kudryavtsev's brigade at the trust's motor transport administration. "Every Day at High Pressure!" became the slogan for drivers. The collective met its five-year plan target in three years. Concrete workers also had a great labor victory. The collective at plant KPD-35 met its socialist obligations ahead of schedule, completing the annual plan for the production of slabs with clay filler. S. Rudakov's youth collective at the concrete mix plant is also attaining excellent production indicators. It is now October on its work calendar. The builders are doing high quality work.

"A Shortage with Sufficiency" was the headline of an article written by correspondent S. Sadoshenko. He dwelt upon issues in straightening out problems in the centralized supply of propane to Volgodonskenergostroy units. Propane shortages are causing delays at the project.

The Microrayon No 18 in Volgodonsk has acquired sufficient experience in massive measures for youth education. In his article "The Face of the New Microrayon", M. Volkov, soviet secretary, explains further improvements in the work of active members and public organizations to improve this work at residential areas.

The Kamgesenergostroy [Kama GES Energorstroy] Production Association and the Tatar Energostroy Construction Administration are the main lumber suppliers to Atommash. However, this is not the first year that these enterprises have broken delivery deadlines, and caused delays in supplies to projects at the plant and the city. This was indicated in the letter "Suppliers are Letting us Down" written by Ye. Khaustov, a member of the Coordinating Council for the Construction of Atommash. The author stresses that the slogans, "The Workers' Relay Race" and "From Mutual Complaints to Mutual Help and Support", above all call for the precise observation of contractual obligations.

The paper also published reports by V. Navozov "The Dispute has been Solved by Computer", V. Suvorovoy's article "Cast from one Metal", and answers to critical articles.

Kuz'ma Volgodonskiy wrote a topical satire "Everyone is 'for", but who is 'against'?"

This issue provides readers news of culture and life, and current information.

Activities Surveyed

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Aug 84 p 2

[Article: "Plan and Fact"]

[Text] Continuing its roll-call of brigades on cost accounting, in Issue No 31 (291), in the section "SOTSIALISTICHESKAYA INDUSTRIYA at Atommash" the article "Be a Manager" contains comments by T. Karabanov, brigade leader at the SMU-3 Housing Construction Combinat of the Volgodonskenergostroy Trust. He writes that the brigade contract is a school of economic education in socialist enterprise. It helps unify the collective. They have begun to efficiently approach work. However, it is a pity that sometimes builders' successes are reduced to nothing due to the failures of some suppliers.

"An Important Link" was the title of an article written by V. Balasyuk, Atommash Party Committee deputy secretary published in the section "The Party Committee: Methods and Style". He analyzes the work of the commission to control the activity of the administration. More than 300 communists in the association participate in its activities.

Not a single underground utility in the new section of Volgodonsk escaped corrective work. This delayed construction and increased its costs. What are the reasons for this situation? The article by A. Zornin, "Corrections" published in the correspondence section, answers this question.

The readers can get acquainted with the pages of "Youth Orbit", describing the labors, plans, life and leisure of young builders and operaters at Atommash.

11574
CSO: 1822/434

BRIEFS

KALININ AES--The first energy assembly of the Kalinin Nuclear Power Plant with capacity of one million kilowatts has begun to produce power. The designers and builders of the AES embody in metal and concrete the latest advances of the most diverse fields of science and technology. Installation of designs in large assemblies and laying concrete by using pumps are used here, which considerably accelerates the rates of work. A triple shielding system provides complete guaranteed protection of maintenance personnel against radioactive radiation. The builders have pledged themselves to put yet another one million-kilowatt energy assembly into operation before the end of the five-year plan. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Jun 84 p 1] 6521

ARMENIAN AES--Metsamor--The 25th billion kilowatt-hour of electric power has been generated at the Armenian AES. This position was achieved 1 month ahead of schedule due to clear interaction of all services and subdivisions. The firstborn of nuclear power engineering of the Transcaucasus is a little more than 4 years old. Enterprises of the electronics and electrotechnical industry have been created on its basis and development of agriculture has been accelerated. Generation of electric power in Armenia now comprises more than 13 billion kilowatt-hours annually. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 3 Jun 84 p 1] 6521

SMOLENSK AES--A set of DC units, manufactured at the pilot plant of the Orenburg Production Association Elektropreobrazovatel', was shipped to the Smolensk Nuclear Power Plant 10 days ahead of the deadline. Next is the order of the Balakova AES: the leading brigade of the party organization of shop No 12 of Sh. G. Kizigulov is completing assembly of the set ahead of schedule. A record increase of labor productivity--30 percent--has been achieved in the shops of the plant during the past several months. An economic experiment, according to which the main planning indicator is the volume of product sales with regard to the discipline of contract deliveries, begun at the enterprises, helped to achieve this. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 24 Jun 84 p 1] 6521

SOUTHERN UKRAINE AES--Nikolayev Oblast--One of the most important phases of construction was begun a few days ago at the Southern Ukraine AES--welding of the main circulating circuit. A group of highly skilled welders of the Konstantinovo Installation Administration of the Teploenergomontazh Trust--A. Yesipatenko, N. Zakharov, N. Lozinskiy, V. Andryushchenko and others--are

doing the welding. Skilled in their craft, they distinguished themselves in construction of the primary energy assembly, having completed the same complicated work--welding of the main circulating circuit within 6 months. The installers now count on completing this work in almost half the time. There is also no lag at other facilities of the construction project, understanding the ever increasing price of each shift and each working hour: the second energy assembly is supposed to be turned over for operation this year. The builders and installers appealed to their suppliers at the beginning of the year to provide equipment, structural members and materials to the construction project on time. The collectives of practically all the supplier plants responded to the appeal, published in the Nikolayev Oblast newspaper YUZHNAYA PRAVDA. Vigorous measures to accelerate deliveries of production equipment were specifically adopted at the associations Krasnyy Kotel'shchik (Taganrog) and Sibenergomash (Barnaul) and at the Belgorod Energy Machine Building Plant. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Jul 84 p 1] 6521

NOVOVORONEZH AES--The Novovoronezh AES has generated 150 billion kilowatt-hours from the day it was started up. The primary energy assembly was completed in 1964. The capacity of the AES has now reached almost 2.5 million kilowatts. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 20, May 84 p 2] 6521

NEW HEAT EXCHANGERS--The cost of a new set of heat exchange equipment for AES with VVER-1000 reactor, manufactured at the Taganrog Krasnyy Kotel'shchik Plant, has been reduced by 1.6 million rubles. It passed interdepartmental trials in the primary energy assembly of the Zaporozhe AES, having received high marks of the operators. The new heat exchange equipment provides more completely and reliably conservation of approximately 200 tons of valuable materials. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 May 84 p 2] 6521

6521
CSO: 1822/370

NEW THRUST BEARINGS FOR POWER GENERATORS DEVELOPED

Moscow PRAVDA in Russian 25 Jul 84 p 2

[Article by A. Ishlinskiy, director of the Institute of Problems of Mechanics of the AN SSSR /USSR Academy of Sciences/, academician; and P. Neporozhniy, USSR minister of power and electrification, corresponding member of the AN SSSR, under the rubric "Competition for the USSR State Prize": "Bearings for the Giants"]

[Text] Along with the construction of thermal and nuclear power stations the decisions of the 26th CPSU Congress and the Energy Program have provided for considerable development in the hydroelectric power industry. This is dictated by the necessity not only to increase electric power generation but also to improve the operation of power systems. The latter is achievable because of the great maneuverability of hydroelectric station generator units. In a matter of minutes they can come up to full capacity and switch on the system, and with a reduction in load they can just as quickly "dump" capacity, which thermal and nuclear power stations so far cannot do.

The unit capacity of hydraulic turbogenerator units has grown steadily. The turbines operating at the Volzhskaya GES have a capacity of 115,000 KWh, at Bratsk 250,000, at Krasnoyarsk 500,000 and at Sayano-Shushensk 640,000. Along with this there has been a sharp increase in the load on the thrust bearings. Structurally a thrust bearing is a bushing firmly fixed to a shaft and rotating with it, and with a disc with a mirror surface below it. Through this disc it rests on bushings arranged in a ring or on so-called segments coated with an anti-friction material, for which babbit has usually been employed.

With the growth in thrust-bearing load the customary babbit coating of the friction surfaces of the segments was no longer

reliable enough. There were cases where it failed, especially during the startup and shutdown of generator units, thus reducing their maneuverability.

A solution to these problems has been found by scientists of the Kuybyshev Aviation Institute, by creating a wholly new type of segment -- a polymer bearing designed on the basis of elastic deformation. A thrust bearing with these elastic metal and plastic segments has an increased load capacity and is able to distribute the load evenly over the whole area of a segment, with a low friction factor.

Obviously, all this has required a complex of research, the development of a wholly new technology for manufacturing elastic metal and plastic antifriction bearings, and the performance of various bench tests. The work has been done jointly with power specialists of the Volzhskaya GES imeni V. I. Lenin. Thrust bearings with exceptional types of new segments have been tested at the Volzhskaya, Saratovskaya, Bratskskaya, Ust'Ilimskaya and Plyavin'skaya GESes. More than 9 years of operation of these bearings has confirmed the high operational quality of the new construction.

The experience accumulated has made assembly-line production of the new segments possible. By decision of the USSR Ministry of Energy, production of them started in 1981 at the Cheboksary Energozapchast' Plant. About 100 generator units of hydroelectric power stations have been equipped with modernized thrust bearings. According to the calculations of the experts the annual economic effect from the adoption of this innovation is in excess of 10 million rubles. In the next two or three years the thrust bearings of all major hydraulic power generator units will be completely converted to elastic metal and plastic segments. This is the first time that elastic metal and plastic bearings for large thrust bearings designed for high loads have been developed, put into production and widely adopted anywhere in the world.

The decisions of the 26th CPSU Congress provide for the construction of major hydroelectric power stations on the rivers of Siberia, the Far East and Central Asia. In the future, GESes will be built with generator units of a unit capacity up to one million kW (Osinovskaya, Turukhanskiy, Nizhnelenskaya, and others). And here we have a very complex problem--producing a reliable thrust bearing with a unit load that can reach 100 kgf per square centimeter. But even this problem has been successfully solved by the scientists of the Kuybyshev Aviation Institute together

with specialists of the Cheboksary Energozapchast' Plant, the Soyuztekhenergo Industrial Association and a number of hydroelectric power stations.

An experimental thrust bearing with elastic metal and plastic segments and a unit load of 80-100 kgf per square centimeter has been in operation since April 1982 in one of the generator units of the Volzhskaya GES imeni V. I. Lenin. The segments developed by the experts of the Kuybyshev Aviation Institute have been subjected to tests in all of the generator unit's operating modes, including the heaviest, have successfully passed them, and are continuing to function without restrictions of any kind.

The development and successful adoption of elastic metal and plastic bearings in the thrust bearings of hydroelectric generator units opens up wide vistas for their use in other sites of friction in heavy duty power machinery.

The joint work of the experts of the Kuybyshev Aviation Institute and the power specialists has promoted competition for the USSR State Prize for 1984. That work represents a wholly new contribution to the development of science and technology and has had a great economic impact on the country's national economy.

12697
CSO: 1822/431

NEW UZBEK POWER STATION BEING BUILT

Tashkent PRAVDA VOSTOKA in Russian 24 Jul 84 p 1

[Article: "The Novoangrenskaya GRES [State Regional Electric Power Station] - A Construction Project of the Five-Year Plan"]

[Text] In September of this year the republic's electric power industry observed the 50th anniversary of the Uzbek Power System, and in October, the 60th anniversary of the formation of the UzSSR and the Communist Party of Uzbekistan.

In honor of these outstanding dates the workers of the Uzbek Power System during the fourth decisive year of the 11th Five-Year Plan have generated for the national economy nearly 44.5 billion kWh of electricity and 22.1 million gigacalories of thermal energy. In the generation of electricity the republic exceeded in this year the goal set for the end of the current five-year plan.

Socialist competition has been launched everywhere to successfully complete this year's state plans and the anniversary commitments. Enthusiasm is especially high for an urgent construction project of the five-year plan -- the Novoangrenskaya GRES which has a capacity of 2.4 million kW. Here a very important task is being carried out that was set by the USSR Energy Program in the field of producing electric power. The GRES will operate on cheap coal obtained by open-pit mining.

After overcoming a slow start, the builders' collective has taken all steps to start on time the first power generator, which has a capacity of 300,000 kW. Its operation has been set for the 60th anniversary of the formation of the UzSSR and the Communist Party of Uzbekistan. And during the coming years a total of eight power generators of this capacity will be put into service, and the Novoangrenskaya GRES will generate billions of KWh of cheap electric power.

12697
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ADVANTAGES OF BUILDING MID-YENISEY GES URGED

Moscow EKONOMICHESKAYA GAZETA in Russian No 32, Aug 84 p 16

[Article by A. Mukoyed, USSR Gosplan commissioner for the East Siberian Economic Region, under the rubrics "The Energy Program in Operation" and "A Comprehensive Evaluation of its Effectiveness": "The Mid-Yenisey GES "]

[Text] The Lesosibirskiy industrial center in the Nizhne-Angara territorial-industrial complex is famed for its rich hydroelectric, mineral, timber and other natural resources. Located here are the Gorevskiy lead and zinc and the Porozhinskiy manganese deposits. There is a provision to set up within the industrial center a cellulose and paper combine, ferroalloy and hydrolytic-fermentation plants, and a number of other power-intensive industries.

The power core of all these installations will be the Mid-Yenisey GES, with a capacity of six million kW. More than 30 billion kWh per year will be generated by this projected new giant on the Yenisey.

The Mid-Yenisey GES will complete the circuit of hydroelectric stations on the Lower Angara and the Mid-Yenisey. Occupying a site just below the junction of the Angara and the Yenisey, it will utilize the flow from both rivers, which has already been regulated by the very large reservoirs of the Boguchanskaya, Ust'Ilimskaya, Bratskaya, Irkutskaya, Krasnoyarskaya, Maynskaya and Sayano-Shushenskaya GESes. This situation produces an unusual station, not like the "elder sisters," which experience the severe impact of spring floods, and lose capacity in winter. These GESes therefore are normally converted to operate in the peak load mode. The Mid-Yenisey GES will be as free as possible from these shortcomings.

The upstream regulation of the river current makes it possible for the Mid-Yenisey GES to operate for much of the time in its base mode. The number of hours that its rated capacity is usable is 1.5 times greater that at the Krasnoyarsk or the Sayano-Shushensk stations.

Given the minimal variation in water level, the Mid-Yenisey GES reservoir is exceptionally suitable for economic exploitation of its banks: for land reclamation, constructing wharves and arranging navigation and establishing major fishing industries.

The construction of such a giant is naturally far from simple. There are, unfortunately, sceptics who raise doubts about the desirability of building the GES in the near future, out of fear of the extremely high costs.

And so, at first glance, they are. The artificial sea will in fact inundate a large area. Eighty-eight populated places will be put under water. Five hundred forty km of highway will be destroyed. Forty-eight thousand people will have to be resettled.

These are impressive figures. But, whereas in the past, expenses related to the cost of a GES were defined by estimated losses in the form of the residual balance-sheet cost of demolished and inundated buildings and structures, including roads and networks, and the loss of standing crops, there is now a different approach. A GES estimate includes the expenses not only of compensating for losses, but also for the expansion and reconstruction of installations, and the creation of a production and daily-life infrastructure with a high level of amenities and comfort. All this helps to attract people to the new settlements. This approach is economically justifiable, since in the past the majority of people resettled from areas inundated by Siberian GESes took their compensation and went elsewhere.

It is legitimate to ask whether one should put all these expenses under the single heading of losses and reimbursement. Of course not! For the state the other side of this item of expense is related to the emergence of new materials of value and new basic resources that will yield an enormous return during the life of the project.

There will be considerable timber resources in the inundated area -- 4.5 million cubic meters in the first phase and 19 million for the whole project. But this is mainly commercial timber.

Major timber enterprises have already been established here, which are carrying out and should continue to carry out planned timber purchases. There is every possibility that not a single valuable trunk will be left on the bottom.

And there is still another important aspect. The cost of the Mid-Yenisey GES includes expenses for the construction of a double-compartment, double-train lock with separate channels and capable of handling a growing volume of traffic by vessels of various sizes. During construction there will be no halt to navigation in the area of the GES. The project provides for temporary navigational facilities. The other GESes of the Angara-Yenisey circuit, either in operation or under construction, (except for Krasnoyarsk) include no provision for allowing vessels through.

All these matters should, of course, enter into the evaluation. Furthermore, the project for the hydrocenter facility also provides for a motor vehicle roads and a railroad over the Yenisey, which would be of great importance for developing the right bank of the Yenisey and the Angara.

We have every reason to believe that the Mid-Yenisey GES will be, from the national point of view, one of the most efficient GES of the Angara-Yenisey circuit.

There are many problems connected with the Gorevskiy lead and zinc deposit. The main mass of the ore body near the surface of the earth runs under the bed of the Angara. To develop the deposits by the open pit method requires diversion of the river and construction of a channel or establishing an open pit partitioned off by dams to narrow the bed by more than half.

The first method, which was immediately dropped, would have cost more than one billion rubles; and the second, 300 million rubles. But how to escape the increased velocity of the current in the narrowed river course which the latter threatens by dam erosion and ice jams? A way out has been found in the joint design studies of the dam builders and mining engineers.

If, when building the dams and the GES structure, you raise the reservoir head by 20 meters (first phase), then the likelihood of danger in the open pit area is eliminated.

The dam builders have agreed to be the contractors to build these dams in full profile, perform cementing and other work, and set

up a mining and beneficiation combine. The GES will therefore not inundate the deposit, but, on the contrary, building it will be the necessary condition for an open pit mine.

The USSR Ministry of Energy, which recently affirmed the technical and economic basis for construction of the Mid-Yenisey GES, has approached the matter from the national viewpoint. Favorable conditions have thereby been created for joint work with other interested organizations for the comprehensive development of the Lesosibirskiy industrial center. We believe that this work should be launched in the first days of the 12th Five-Year Plan, and that the time to prepare for it is now.

The startup of construction of the Mid-Yenisey GES will make it possible to undertake the active development of populated places and also to construct engineer communications lines in the zone of influence of the GES. It is also time to think about a planned transfer of the welding collective of the Krasnoyarskgesstroy dam builders to a new place of work site, since they will have completed all the basic work at the Sayano-Shushenskaya and Maynskaya GESes in the current five-year plan.

12697
CSO: 1822/431

BRIEFS

AMU-DARYA POWER PLANT OPERATING--The sixth and last power generating unit of the first power plant of Amu-Darya River has begun supplying electricity for the industrial field. Currently, the capacity of the first power plant on Amu-Darya has risen to 150,000 kw. The entire Soviet homeland has participated in the construction of the power plant. A total of 9 months were sufficient for the builders to set up and operate the turbines of the installation. The depth of the dam of the power plant is 20 meters. A total of 5.3 billion cubic meters of water will fill the dam of the plant and this will increase the number of irrigated hectares of land. When the installation is fully completed the reservoir will hold 7.8 billion cubic meters of water. A total of 500,000 hectares of land will be irrigated and the supply of water to Rurkmenistan's Chardzhou and Tashauz oblasts and to Kara-Kalpak ASSR and Uzbekistan's Khorezm Oblast will be improved. [Tashkent Domestic Service in Uzbek 0215 GMT 26 Oct 84 GF]

CSO: 1836/412

COMPRESSOR STATION DESIGN STANDARDIZATION PROMOTED

Advantages of Standardization Discussed

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 84 pp 10-11

[Article by V. S. Makarov, M. V. Zaryankina and V. L. Lebedev: "Broader Use of Unified Compressor Station Designs"]

[Text] Unit-modular compressor stations with gas-pumping equipment are presently being designed and constructed with the use of standard designs developed by the design institute of Mingazprom [USSR Ministry of Gas Industry] in conjunction with the design and construction organizations of Minneftegazstroy [USSR Ministry of Petroleum Gas Industry Construction] and other ministries and agencies. These designs make maximum use of industrially-manufactured unified modular and modular-unit equipment.

Principles of industrialization and industrially-based improvement of construction quality, all-round unification of the design of the entire compressor station complex, as well as the general layout, buildings and equipment, the technological, structural and architectural solutions, foundations and structural engineering, design and planning efforts were included in the design solutions and took into account the specific climatic conditions.

Unification makes it possible to clearly designate the production and operations services are as of the complex. The zoning of installations, buildings and equipment at the site of a compressor station makes it possible to create better and safer operating conditions, reduce the length of communication lines and to work out a unified principle for general planning that allows expansion of the station from the first stage of its construction. One modular-unit building, the operations and power block, groups together the services that operate the compressor station and provide its power. Another modular-unit building with completely disassemblable sections, the operations service and repair block houses auxiliary services such as the garage, storehouse, mechanical repair shop, chemical laboratory and the administrative offices and personnel housing. This arrangement improves operating conditions, reduces the lines of engineering communications and lowers the volume of construction work on the station site.

Installations and equipment used for the same function and which do not require the constant presence of service personnel are arranged in single modules or in prefabricated module-containers which makes possible to reduce labor-construction costs by a factor of 2. The predominant use of surface-built engineering

communications on the grounds of the compressor station and the use of industrially-manufactured foundations (piles and modular foundations) makes it possible to improve operating reliability and to reduce the amount of earth-moving work.

Unification makes it possible to use previously developed, better designs that are essentially identical for compressor stations with various types of pumping equipment. The introduction of standard designs based on the unit-modular method of construction can lower by 15-17 percent the labor costs of construction, increase the building density from 39 to 45 percent, reduce the amount of structural metal by 12-35 percent and reduce construction time 10-35 percent.

Considering the great effects achieved from the preparation of standard designs for unit-modular compressor stations, it was recommended that similar work be conducted on the unification of other oil and gas industry facilities. This work was begun by the SPKB Proektneftegazspetsmontazh [Oil and Gas Industry Specialized Outfitting and Design Bureau] in conjunction with the Minnefteprom and Mingazprom design institutes.

Analysis of the composition of auxiliary buildings and equipment of various above-ground installations used in the oil and gas industry such as gas compressors, petroleum and product pipeline pumping stations, pertroleum and gas treatment plants, gas-lift compressors, construction bases, etc., has shown us that about 70 percent of them are identical in function and similar in their technical specifications.

In connection with this, it is advisable for Mingazprom, Minnefteprom and Minneftegaz to jointly prepare proposals for unifying the design of these buildings and equipment using a unit-modular design and to compile on this basis a catalogue of unified designs for use by the various sectors of the industry.

Designs developed by SPKB Proektneftegazspetsmontazh for a service-and-operation and repair block, oil storage and fuel and lubricant materials store room, diesel generator, air compressor, fire-fighting installation as well as a boiler room, the truck air-heating facilities, BIO-type sewage purification facilities; storage facilities, car wash outfitted with Kristall brand cleaning equipment, use of heat for pumping power and chemical water treatment and a drainage system for the pump station may serve as base designs.

These designs were prepared for climatic regions with mean air temperatures of -30°, -40° and -50°C during the five coldest days of the year. The equipment is designed to be housed in UB- and BIV-type boxes [not further identified], BZhK-type containers and SKZ-M [not further identified] sections. The manufacture of such unit-modular devices has been mastered by enterprises specializing in modular and prefabricated structures and factories of Minneftegazstroy.

If it becomes necessary, modifications (variants) can be added to modular-design all-purpose auxiliary buildings and equipment.

Unified designs for unit-modular constructions should become a permanent part of standard design solutions for surface facilities of the oil and gas industries. The introduction of these designs will make it possible to considerably reduce the list of manufactured items, simplify the process of assembling equipment and materials, organize mass production, improve efficiency and quality while lowering the costs of sites under construction.

Unification of Organization, Technology

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 84 pp 20-21

[Article by V. M. Igol'nikov, V. K. Chernenko, S. V. Kozhemyaka: "Features of Unification of Organizational and Technological Decisions in the Construction of Compressor Stations"]

[Text] In 1981-1983, subdivisions of the Urengoy Chief Bureau for Gas Industry Construction [Glavurengoygazstroy] at the Urengoy natural gas deposit built and set into operation six powerful plants for comprehensive natural gas processing and 10 compressor stations along the pipelines starting at Urengoy. The natural gas resources of Western Siberia have been rapidly exploited in recent years. This year, three such gas processing stations and six compressor stations will go into operation. Exploitation of the Yamburg gas deposits will require large investments. Urgent tasks are the continued expansion of the use of high-output equipment, development and introduction of standard designs for new stations, increased volume and further improvement of the unit-modular method of construction based on the development and introduction of fundamentally new unified organizational and technological designs that use production brigade output lines.

A prerequisite for creation of such solutions was the work done by the Mingazprom and Minneftegazstroy organizations on standard designs for compressor stations with various types of gas-pumping equipment. In these stations, the technological designs for buildings and equipment used in the compressor station complex were unified and there was created a single unified general plan that divides the station into operations and auxiliary zones. Glavurengoygazstroy, SibNIPIgazstroy [Siberian Scientific Research Institute for Natural Gas Industry Construction] and Mingazprom have carried out a large amount of work on the unification of equipment and design solutions for the comprehensive gas treatment plants of the Urengoy deposit.

The Kiev Institute of Engineering and Construction in conjunction with Glavurengoygazstroy and the Kiev branch of the TsMIPKRR [Central Moscow Planning and Design Institute] under MISI [Moscow Red Banner of Labor Engineering and Construction Institute imeni V. V. Kuibyshev] developed unified organizational and technological designs. These designs were a further development of work[1] conducted by the All-Union Scientific Research Institute of Pipelines [VNIIST] and the Scientific Research and Design Institute of Petroleum Gas Construction

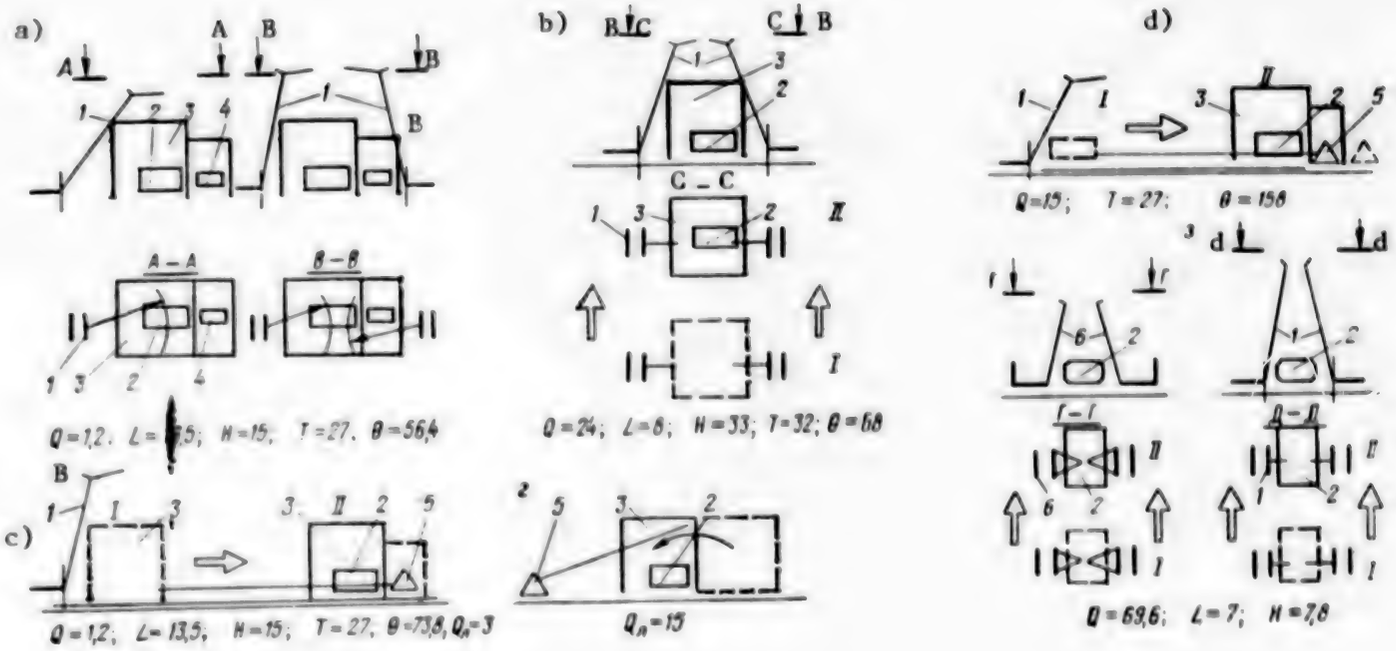
Industry Organizations [NIPIorgneftegazstroy]. The given designs contained a complete set of recommendations on general construction and specialized work. They were based on a single system of unification and cover all of the basic work from the groundbreaking to the start-up of the compressor stations. The design included work flow-charts, calendar schedules for operations and instructions on quality control, mastering station work and safety techniques.

The basis for the formulation of organizational and technological solutions was a total-system approach to the method of work. This included all of the organizational processes, mechanization and the methods used for the execution of basic operations.[2] For each of the above, there was established a varying number of solutions that can be used in the performance of construction and assembly work. The features of the overall organizational and technological structure of the method of carrying out any construction and assembly process in the erection of a compressor station were revealed from these items.

Great care was taken in the organization of labor, and the sequence in which structures, materials, personnel and machines were brought into the construction process, the supply and delivery of sets of parts, structural components, materials, etc. Attention was paid to the mechanization of the individual processes, the streamlining of methods used to perform those processes and operations connected with the preparation, arrangement and installation of parts, equipment, materials and constructions and their adjustment, placing and attachment according to design. On the basis of these principles, the selection of organizational and technological solutions is made and possible variants to work methods are formulated. For example, drawings show diagrams that illustrate the possible methods of mounting structural components and technological equipment for a compressor with GTN-25 turbines (these were also applicable for carrying out installation work in the construction of compressor stations with GTN-6 and GTN-16 turbines). Every plan has its own technical and economic reference indicators establishing maximum parameters for the lift mass, depth of feed, lift height, time span for the erection of the compressor station and the labor costs for this work.

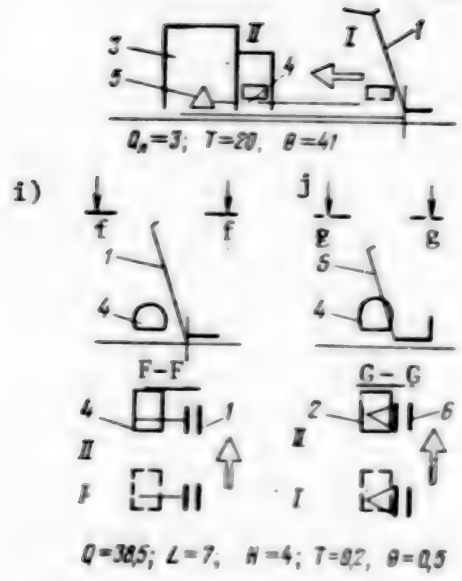
For practical use of a system of unified organizational and technological solutions, it is sufficient to determine first the method and general work strategy for the given work process. We then use this method to determine, according to the given conditions, a set of technological decisions for all possible components introduced in manuals[3,4] and then apply them to the particular project. To reduce the amount of time spent on finding designs for the individual components, we may use the appropriate models (algorithms) as well as special matrices in the form of instructions or designs (see table). This standardizes not only the structure and essence of the work method but the technology as well, making it more industrialized and opening up ways of using production lines.

Preliminary assessment of the use of unified organizational and technological solutions in Glavurengoygazstroy have shown the possibilities for improving the effectiveness of technology and organization of construction and installation work in the building of compressor stations by selecting the necessary solutions from a large number of variants. The same procedure makes it possible to reduce labor costs and time spent to coordinate the design solutions, rational distribution of the work load among construction crews involved in the final stages of work.



Formation of an assembly method for GTN-25 turbines with variant solutions of organization and technology.

Work conditions	Assembly method	Components of assembly method		
		Organization	Mechanization	Procedures
Foundations beneath gas pumps finished. GTN-25 turbine and blower installed Shelter must be assembled in short amount of time.	Rearrangement of shelter for previously installed gas pump	1. Direction-lengthwise and across. 2. Separate sequence of installation	1. Comprehensive. 2. Mobile assembly equipment. RDK-25 crane, D-365 pipe layer	1. Rigging by loop or protrusion 2. Lift - free, forced during shift 3. Restricted-free training and placement, free, forced. 4. Adjustment by instruments. 5. Bolt attachment



Variations on methods used to mount structures and technological equipment for compressor stations with GTN-25 turbines:

a-d structural components
a - element assembly; b - rearrangement; c - movement; d - turning.
d-j technological equipment:
e - moving of turbine; f - moving of blower; g,h - free lifting and shift of turbine with pipe layers and cranes;
i-j - free lifting and shift of blower with pipe layers and cranes.
1. assembly boom crane; 2. turbine; 3. compressor shop (power division); 4. blower; 5. pulling winch; 6. pipe layer.
Q - lift mass, t;
L - depth of feed, m;
H - height of lift, m;
T - time span of construction of compressor shop, days;
O - labor-intensiveness, man-days.

FOOTNOTES

1. A Complex of Technological Schemes for an All-purpose Technology for Construction of Unit-modular Surface Facilities in the Oil and Gas Industry [Kompleks tekhnologicheskikh skhem universal'noy tekhnologii stroitel'stva komplektno-blochnykh nazemnykh ob"iktov neftyanoy i gazovoy promyshlennosti], VNIIST, 1982.

2. Chernenko, V. K., Methods of Assembly of Structural Components [Metody montazha stroitel'nykh konstruktsii], Kiev, Budivel'nik, 1982.

3. Unified Organizational and Technological Solutions in the Construction of Compressor Stations With GTN-10-4a Turbines (Designs) [Unifitsirovanye organizatsionno-tekhnologicheskie resheniya vozvedeniya KS s agregatom GTN-10-4a (proyektnye razrabotki)], Kiev, KISI, 1983.

4. Unified Organizational and Technological Solutions in the Construction of Compressor Stations with GTK-25 Turbines (Designs) [Unifitsirovanye organizatsionno-tekhnologicheskie resheniya vozvedeniya KS s agregatom GTN-25 (proyektyne razrabotki)], Kiev, KISI, 1983.

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TIME, LABOR COSTS OF COMPRESSOR STATIONS ANALYZED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 8, Aug 84 p 22

[Article by I. S. Izvolinin, S. A. Schetko: "Analysis of the Time and Labor Costs for Construction of Basic Compressor Stations"]

[Text] During the Eleventh Five-Year Plan, Minneftegazstroy's efforts will be concentrated on the construction of 250-260 compressor stations. The majority of these projects fall within 1983-1984.

Analysis of the pace of compressor station construction during 1979-1981 shows that the average amount of time spent on the construction of these installations was 13-15 months. Labor costs for the construction of a compressor station with GTK-10-4 compressors was 120,000-130,000 man-days, 90,000-95,000 man-days for stations with STD-12500 compressors and 80,000-85,000 for stations with GPU-10 compressors. These figures do not include labor costs for the construction of buildings and communications outside of the compressor station site. With the unification of materials planning, structural and technological solutions in the further introduction of high-output gas-pumping equipment, the housing of equipment in unit-boxes and containers, the average construction time for compressor stations during 1982-1983 was 10-13 months. The figures for labor costs in the construction of compressor stations for the Urengoy-Novopskov pipeline and the primary compressor stations of the Urengoy-Uzhgorod pipeline are given below (the numerator is percent of overall labor costs and the denominator is the number of man-days):

If we assu[illegible] 100-percent labor costs in the construction of a compressor station with 8 GTK-[illegible]-4 compressors, then, depending upon the type of units used in the station, their reduction will be: 20 percent for 6 STD-125000's; 31 percent for 8 GPU-10's; 35 percent for 3 GTN-25's; and 39 percent for 5 GPA-Ts-16's.

Let us examine the construction of the compressor stations on the Urengoy-Uzhgorod pipeline. The unification of the general plans for stations built in a single technological corridor in the Urengoy-Uzhgorod and Urengoy-Center I,II pipelines provided a zone for the operations-technological complex (area of equipment and bindings, gas air treatment and dust removal area, gas treatment unit, operations block and back-up turbine generator) and a zone for the service-operations complex (service operations repair unit with a garage, store room,

	ГТК-10-4 (1) (8 шт.)	ГПУ-10 (2) (8 шт.)	СТД-12500 (3) (6 шт.)	ГПА-Ц-16 (4) (5 шт.)	ГТН-25 (5) (3 шт.)
(6) Нулевой цикл	39 39 780	38 26 600	41 33 620	45 28 000	41 27 000
(7) Монтаж каркасно-панельных зданий блок-боксов и СКЗ	19 19 380	18 12 600	18 14 760	13 8060	20 13 200
(8) Механомонтаж ГПА с обвязкой малыми трубопроводами	3.7 3780	3.8 2660	3.3 2700	5.4 3350	4.5 2970
(9) Монтаж технологического оборудования и трубопроводов	15 15 300	17 11 900	13 10 660	16 9920	15 9960
(10) Электромонтаж	4 4080	5 3500	6 4920	4 2480	3.5 2310
(11) Монтаж КИПиА	4 4080	4.1 2870	4 3280	4 2480	3.5 2310
(12) Внутренние сантехнические работы, устройство вентиляции	3.3 3360	3 2100	3 2460	2 1240	2.5 1650
(13) Отделочные и изоляционные операции	5 5100	4.1 2870	4.7 3860	3.6 2230	3.5 2310
(14) Монтаж систем связи, сигнализации и радио	1 1020	1 700	1 820	1 620	1 660
(15) Благоустройство и ограждение	4 4080	4 2860	4 3280	4 2480	3.5 2310
(16) Пуско-наладочные работы, испытания	2 2040	2 1400	2 1640	2 1240	2 1320
(17) Общие трудозатраты	100 102 000	100 70 000	100 82 000	100 62 000	100 66 000

Key:

1. GTK-10-4 (8 units)
2. GPU-10 (8 units)
3. STD-12500 (6 units)
4. GPA-Ts-16 (5 units)
5. GTN-25 (3 units)
6. Zero cycle
7. Assembly of the panel-frame buildings, unit-boxes and SKZ [expansion unknown]
8. Mechanical assembly of hydraulic pumping units and strapping of small pipelines
9. Assembly of technological equipment and pipelines
10. Electrical assembly
11. Assembly of the KIPiA [expansion unknown]
12. Interior sanitary technical work, installation of ventilation
13. Finishing and insulation work
14. Assembly of communication lines and radio system
15. Grounds improvement and enclosure
16. Start-up adjustment and testing
17. Total labor time

engineering structures and communications, staff cafeteria, etc.). The service and operations complex zone is designed for all compressor stations with an area of 7 hectares and 30-40 installations. Therefore we can under some conditions consider the object of work for the zone of the service-operations complex to be identical for all types of compressor stations. The overall labor costs for compressor stations depends upon the zone of the operations and technological complex and especially the amount of labor required to build the compressor installations and the basic type of technological equipment used.

Preliminary calculations on the Pomarskaya, Verkhnekazymskaya, Priozernaya, Oktyabr'skaya, Komsomolskaya, Sosnovskaya and Bobrobskaya compressor stations have shown that the labor costs for construction of the service and operations complex zone may be between 30,000 and 38,000 man-days.

At compressor stations with GPA-Ts-16 compressor units, the greater part of the labor goes into the zero cycle (45 percent) with another 47 percent (not counting finishing, insulation and grounds completion work) going into assembly and specialized work. This means that GPA-Ts-16 units are the most economical in terms of reducing labor in the zones of the operations and technological complex as well as the extent of construction and assembly work.

With a reduction in the overall labor costs in construction of compressor stations with GPA-Ts-16 and GTN-25I units unified with service and operations zones, the critical means for the building of these compressor stations go over to a service and operations complex having a great number of auxiliary facilities and engineering communications. This attests to the need for more work by design institutes to improve the zones of service and operations complexes by means of reducing the building surface area and the length of communications and to block together auxiliary objects, etc., as much as possible.

The increase of the degree of industrialization of compressor stations has made it possible to reduce labor spent on assembly and specialized work which, in turn, has increased the labor available for building zero cycles.

The division of areas of compressor stations built in one technological corridor of the Urengoy-Uzhgorod and Urengoy-Center I,II pipelines into zones of service and operations complexes has not only made it possible to lay out the buildings and construction of compressor stations in a rational manner and to develop a single principle for the compilation of general plans but also to justify the efficiency of using increased-output GPA-Ts-16, GTN-16 and GTN-25I units. In the construction of these units a tendency to lower the labor-intensiveness of construction and assembly work in the basic operations and technological zone has been noted. Unification and later the standardization of the service and operations complex zone is a reserve for even further lowering the time span and labor-intensiveness in compressor station construction. A single technological corridor enables the use of flow-through methods of compressor station construction and organization of single reinforced production lines that can travel from one area of construction to another along the pipeline corridor.

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ENERGY CONSERVATION

CEMA COUNTRIES EXPAND ENERGY CONSERVATION PROGRAMS

CEMA Meeting Sets Goals

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Introduction to Series of articles: "The Course to Energy and Fuel Conservation"]

[Text] The countries of the CEMA, having embarked on an intensive development path, are carrying out important programs to increase the efficiency of utilization of their fuel and energy resources. At the 37th meeting of CEMA, basic objectives for cooperation in this important area were reviewed and approved. They include, in part, expanded cooperation in the production of energy and resource conserving equipment, improved planning of fuel and energy consumption, developing and introducing improved consumption norms, accelerated production of microprocessor equipment related to energy conservation, increased sharing of experiences and offering of services.

At the request of the editorial offices of SOTSIALISTICHESKAYA INDUSTRIYA, specialists and publicist from the fraternal countries have agreed to write about this important work for today's edition.

Poland's Fuel Resources Analyzed

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by T. Mechik, Polish publicist: "The Advantage is Obvious"]

[Text] Warsaw--The basic type of power generating fuel in Poland is coal. This "black gold" along with nuclear power are our most reliable and promising fuel sources. Alternative resources have not yet received significant developmental attention in our country. This is due both to prevailing climatic conditions and to the high capital expenditures that are required both for research and development and for the production of equipment.

A third, and no less important source, is energy conservation, which permits significant savings in hard to obtain energy resources with minimal expenditures.

The coal reserves of this country are indeed great. Proven reserves amount to about 62 billion tons, and probable reserves have been estimated at a total of 102 billion tons. This, however, in no way means that the Polish People's Republic (PNR) is a country of cheap energy. Indeed, over time the capital expenditures associated with the discovery of new coal deposits, its extraction, processing, transportation and power generation will continually increase. By the end of this century approximately 60 percent of our mines will be extracting coal from depths in excess of 1,000 meters, and there will be other serious problems as well.

A comparison of the potential for coal utilization and its prospecting costs with projected needs (an increase of 50 percent over 1980 coal utilization levels by the year 2000) suggests two courses of action.

The first is to accelerate research and development work in the area of processing coal into gas and liquid fuel. The current economic position of the country and the situation in the raw materials base are combining to direct us to broad international cooperation in this important area. Most of the work is being done in conjunction with the USSR, GDR and the CSSR.

The second direction is the conservation of energy and energy resources. This may be achieved above all through a consistent reduction in the energy intensiveness of the national economy. This very strategy is the subject of Government Program No 8 (Pp-8). This program provides, for instance, for the modernization of cement industry equipment by shifting from a wet production method to a dry production technique, which entails a 40 percent saving in expended energy. The situation is similar in ferrous metallurgy and in other sectors.

Or take, for instance, the problem of insulating buildings. Poland is not the only country working on this problem.

There is, quite naturally, great interest in the development of nuclear power in our country. The first nuclear power plant (AES) which will be located near Lake Zhernovets, is in the initial stages of construction. At this point specialists are coming up with a multitude of questions which, it seems to me, can be answered satisfactorily by their Soviet colleagues, who have accumulated considerable experience in the construction of similar facilities.

All of these trends are reflected in Pp-8. We also have, however, a special Government Program for the Conservation of Fuel, Energy and Materials. The special measures contained in this program permeate every aspect of the operations of enterprises and associations. They include, for instance, a planned reduction in energy consumption on the nation's railraods, in households, and on our highways. This will be achieved through the introduction of new, more efficient equipment, engines, meters, etc. In the final

analysis, the task of conservation and improved resource management is not only an economic, but also a political question. Its rapid resolution is particularly essential now, under conditions of an economic embargo and with political pressure being put on our country by the United States and other western countries. This makes cooperation with countries of the socialist community even more essential in so important an area.

Czechoslovakia Outlines Future Energy

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by A. Kuba, Czechoslovak publicist]

[Text] Prague--The past year has been decisive in terms of the fulfillment of the tasks set for fuel and energy conservation by the Sixteenth CPCZ congress and the trade union congress. Meeting these targets has required the mobilization of all the forces and resources at our disposal. Workers have had to deliver to the national economy 125.5 million tons of coal and generate 65 billion kilowatt hours of electricity. They not only fulfilled, but overfulfilled their plan targets.

Because of the republic's limited coal reserves, construction has been halted on electric power plants using traditional types of fuel. Five years ago the CSSR entered the era of industrial nuclear power plants. Two 440 megawatt units are now successfully operating at Jaslovske Bohunice, with two identical units currently under construction there. Four identical units are also under construction at Dukovany, not far from Brno. All of these facilities are scheduled for completion during the 7th Five Year Plan. At the same time, preparations are proceeding on the development of similar AES in both Bohemia and Slovakia that will raise installed AES capacity to 10,000 megawatts by 1990. Even now, however, the nuclear plants that are already operational are making their influence felt by supplying the national economy smoothly with electric power and conserving 10,000 tons of energy coal daily. It may be stated with certainty that nuclear power is the only solution to the problem of assuring future energy supplies for our country.

Large scale experiments are currently being conducted in our republic on the use of nontraditional energy sources: solar power, geothermal, wind, and power obtained from the burning of biogas. Unfortunately, it must be recognized that these forms of energy will make only a minimal contribution until at least the end of the century.

A nationwide inspection of compliance with the program for efficient consumption, which was conducted recently in all sectors of the economy, provided important incentives for reducing fuel and energy consumption in the national economy. The inspection was conducted in accordance with a decision of the CPCZ Central Committee Presidium.

What were the results of the first phase of the inspection?

Above all, it helped to identify ways to resolve problems that had arisen during the fulfillment of the state fuel and energy conservation program. The 16th CPCZ Congress established the goal of achieving minimum mean annual fuel and energy savings of 2 percent in 1981-1985. This amounts to 12 million tons of standard fuel for the five year plan, but an increase in this amount to 14.5 million tons is already being considered. It should also be stated that this level is considered feasible.

Judge for yourselves. The proposals and resolutions proposed by workers may be divided into two parts: the first includes those measures which the workers can implement themselves, such as replacing ordinary electric lights with flourescent lamps, installing heating systems that react sensitively to external temperatures, replacing large motors with smaller, more efficient ones, and the elimination of engine idling. The second set of measures include those that must be implemented over a longer period of time and which require some capital investment.

Substantial attention is being paid in Czechoslovakia to the fulfillment of those objectives set forth in the Comprehensive Program of Socialist Economic Integration and in the Plan of Multilateral Integrational Measures.

Our workers are well aware that with each passing year it is harder and harder to draw energy from traditional sources and they are therefore making efforts on a larger and larger scale to conserve energy. Unfortunately, we are not at the present time using energy very efficiently. This raises a very serious political, economic and social task, namely that it is essential to change our traditional and inefficient approach to energy consumption, change the "energy" consciousness of the people.

Bulgaria Outlines Energy Plans

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by N. Nenov, Bulgarian publicist: "A Matter for Everyone"]

[Text] Sofia--The economical consumption of energy and of fuel and power resources should become second nature in the activities of individuals. Party congress resolutions and government documents direct our attention in this direction. After all, Bulgaria is a small country, poor in natural resources, including fuel. And the fuels which do exist are low in caloric value. It is not accident, then, that an enthusiastic attitude towards the conservation of energy and energy resources is one of the foundations of the national Energy Program, which has been approved by the Politburo of the CPB Central Committee. This program sets forth a development strategy for both the production and the economical consumption of energy through the year 2000.

Energy can be conserved on a broad front, beginning with the producers and ending with the consumers; enterprises and the population. One of the objectives of conservation is the development of highly efficient AES. The

Kozloduy AES produces currently about one-third of the total electricity generated in the country. An important source of conservation is the reduction of the energy intensiveness of production and of household energy use, and the increased utilization of local energy resources. While local coal currently represents 50 percent of the fuel used at thermal electric power plants [TES], this percentage will increase sharply in upcoming years.

The Energy Program, sets forth ambitious technical and organizational tasks for reducing the energy intensiveness of production and making the structure of energy consumption more efficient, as well as basic measures for reducing energy consumption in the municipal-household sphere. At present the main task is to see to it that all citizens become infused with a sense of responsibility for meeting the established objectives and that the movement towards economical energy utilization becomes a truly national one. Mass political organizations can play an important role here. These include the Domestic Front, trade unions, and the Komsomol. Even our weekly, IKONOMICHESKI ZHIVOT, is making a modest contribution to the conservation struggle. As an organ of the CPB Central Committee, it initiated ten years ago a national competition for fuel and energy conservation.

The implementation of comprehensive measures for the conservation of energy, including secondary energy sources, is already having some results. This is evident, for instance, in reduced indicators of the energy intensiveness of production throughout the country. In particular, whereas the output of the industrial and agricultural sectors of the republic increased by 4.6 percent in comparison with the previous year, energy consumption increased by a total of only 3.2 percent. Fuel consumption per kilowatt hour of generated electricity was 383 grams, in comparison with 385.3 grams in 1982.

Energy conservation is a pressing problem. For this reason integrational relationships in this area within the CEMA are becoming more and more essential.

Hungary's Energy Savings, Plans

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by D. Tsipper, director of State Administration for Energy Management of the Ministry of Industry of the Hungarian People's Republic:" "An Assiduous Approach"]

[Text] The standard consumption of energy per unit of national income has declined in Hungary by almost 4 percent in the last five years. Socialist work brigades, efficiency experts and industrial innovators are in the forefront of a campaign for conservation and frugality, and for increasing industrial efficiency. After the adoption in 1980 of the government Energy Conservation Program, more than 1,000 efficiency enhancing proposals and inventions directed at the utilization of less expensive types of fuel, reducing heat losses and energy conservation have been implemented in the republic.

This program has become the concern of one and all. Today it is difficult to find an enterprise which is not involved in the conservation campaign. The results of this campaign are becoming evident.

Enterprise and organizational collectives are purposefully implementing the requirement for accelerating technical progress in the energy field, are developing workable deposits of lignite, the use of which will make it possible to activate a number of TES with a total capacity in excess of 4,000 megawatts.

Although the growth numbers for TES capacity are impressive, increased energy utilization is nevertheless going to be supplied primarily by nuclear power plants. In particular, the Paksh plant will be covering 20-22 percent of the country's electricity needs by 1987.

In addition to traditional energy sources our republic is devoting considerable attention to the utilization of alternative energy resources. In particular, more than 100 million florints will be spent during the current five year plan on expanding the utilization of solar energy. In five years a total solar collection surface of 3,000 square meters will be operable, and a production base will also have been developed which will facilitate the broader application of solar energy.

The heating of housing units represents a source with substantial potential for energy conservation. It currently accounts, according to reliable estimates, for more than 20 percent of the total energy consumption of the country. It is therefore completely logical that a resolution has been adopted regarding the improvement of housing insulation. Preliminary calculations suggest that the installation of new insulation materials will make it possible to conserve, in the 1981-1990 period, the equivalent of 2.7 million tons of oil.

Hungarian specialists are following the achievements and experiences of other countries in this important area. It is our opinion that an expansion of cooperation, both bilateral with the USSR and multilateral within the context of socialist economic integration, holds significant potential and unexploited possibilities.

GDR Energy Plans Outlined

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by Kh. Tsirgibel, state secretary and director of the Working Group for Efficient Energy Utilization of the GDR Soviet of Ministers: "The Foundation of Development"]

[Text] Is it possible to reduce energy consumption by 6-12 percent while maintaining economic growth and expanding housing construction? A difficult, but feasible goal. This has been proven by the example of two of our cities, Cottbus and Rostock, which achieved these kinds of results in competition with

other cities and regions of the GDR. They have been presented with awards for "Exemplary Work in Energy Management." In addition to cities, more than 1,000 enterprises, cooperatives and institutions have received similar awards. Clearly, this is a wide-ranging list indicative of a substantial effort.

Above all, it indicates that issues of efficient energy utilization are receiving top priority in the work of party and managerial organs of the republic, and in the work of many thousands of workers, factory and enterprise collectives throughout the country. Reaching these objectives is far from simple. In accordance with the strategy worked out by the party, energy consumption is supposed to gradually and continually decline through 1985, with savings equivalent to 170 million tons of coal. At the same time, the development of the national economy must be assured with an absolute minimum of primary energy consumption--annual increases of less than 1 percent. Naturally, given this objective the efficient use of energy becomes one of the main foundations of our energy development policy.

The development of a consolidated plan for the generation and use of all types of fuel and energy at combines and enterprises takes place over very short periods of time based on monthly calculations at 5,000 positions for different types of energy sources. Instances where consumption standards are exceeded result in 10-fold fines.

Analyses have indicated that more than 80 percent of energy conservation through 1985 can be achieved through the institution of various scientific and technical measures for the efficient use of energy and energy resources. This once again calls attention to the importance of involving the scientific resources of the country in the resolution of such pressing problems.

Brown coal accounts for 70 percent of the GDR energy balance. For this reason, efforts are being made in our republic to make maximum use of our own energy resources, while using other, imported, sources of energy as raw materials for processes in various industrial sectors. In view of this, their economical and efficient utilization is a fundamental requirement of socialist economic management. At the same time, along with the expansion of the conventional power base, nuclear power plant [AES] capacity will also increase.

The use of secondary energy is an effective means for achieving efficient energy utilization. In the GDR national economy in 1984 plans were made to reuse 80 percent of currently used energy. For instance, in industrial ovens the use of secondary energy for the preheating of the air delivered into the furnace constitutes a very valuable efficiency technique which makes it possible to minimize energy consumption.

Waste-Heat Boilers are also used on a broad scale for the same purpose.

Household appliances are one of the objects of our attention, since they account for almost 12 percent of the energy used nationwide. Thanks to the implementation of the newest scientific-technical findings, which make it possible to introduce programmable controls, efficient refrigerator

compressors, and to improve insulation, we have been successful in reducing by 10-25 percent the standard consumption of electricity in such appliances as washing machines, freezers and refrigerators.

Thirty-six percent of the energy used in the republic is for the heating of dwellings. By 1985 we expect to reduce energy consumption for the heating of new and modernized residential, public and industrial structures by 40 percent in comparison with 1980.

It has been decided to reduce electricity consumption in 1985 by a further 6 percent in comparison with 1980 by increasing the efficiency of, and implementing new scientific technical findings in processes such as electric drives, lighting, electric heating, the use of household appliances, as well as the electric heating of structures.

Transportation equipment uses 15 percent of the energy consumed in the GDR and two-thirds of the diesel fuel. In this area our strategy is to introduce and develop the capabilities of more energy efficient modes of transportation, such as electrified railway lines and barge transport. It is also, of course, necessary to reduce standard fuel consumption by implementing a series of measures for improving the efficiency of its consumption.

Romania Discusses Energy, Conservation

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by T. Popesku, administrative director, Ministry of the Electric Power Industry of the Socialist Republic of Romania: "Where to Find the Potential"]

[Text] The largest system in our country for the heating of water for household requirements with solar energy is successfully functioning in (Benyase), one of the new quarters of our capital city. The total surface area of its water heating equipment exceeds 8,000 square meters. This makes it possible to supply hot water to 2,234 apartments and to save 650 tons of standard fuel per year. In accordance with the national energy program, by the end of 1985 solar energy will be used to heat 50,000 apartments, which will mean annual savings of 15,400 tons of standard fuel.

These facts and figures, in my view, clearly indicate the efforts which are being focused in Romania on making energy consumption and management more efficient. An increase in energy generation will be implemented by the year 2000 by intensifying the use of our hydroelectric generating potential, expanding the use of coal and shales at thermal power plants, developing nuclear power, alternative power sources and energy conservation technology.

A reduction in energy utilization is tied to a modernization of the structure of material production. Measures have been approved with the objective of the priority development of those sectors which utilize less energy and produce high value added items (electronics, precision machinery and optics, small batch chemicals, etc). At the same time substantial savings are being

achieved in those sectors which are basic consumers of energy through process modernization, the installation of less energy consumptive equipment, and a reduction in electricity utilization in household and public facilities. In accordance with the established targets for the current five year plan, total energy consumption should be reduced by 20-25 percent.

Every economic entity is working intensively to meet the established targets.

The Romanian machine building industry has installed a wide range of equipment and apparatus which will make it possible to conserve various forms of energy. Suggestions made by innovators number in the tens and hundreds, and concern both current and prospective applications.

The magnitude of this movement for the economical and frugal consumption of energy makes it possible to conclude that the planned reduction of 40 percent in the mean energy consumption per 1,000 ley of industrial output by 1990 will be achieved.

Cuba Outlines Energy Program

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Article by B. Roberto, Cuban publicist: "Critical Questions"]

[Text] Havana--Installed generation capacity in Cuba is now almost 3,000 megawatts, which is 3.5 times the figure in 1958. At the same time the generation of electricity has increased by a factor of 4.3. But although the achievements are obvious, the problem of increasing the effectiveness and efficiency of energy resource utilization is one of the most critical for the development of the national economy.

Programs are proceeding along the following lines: the conservation of fuel and energy resources, especially those that are imported; expanding the introduction of new types of equipment that conserve fuel; the use of new, renewable resources, such as the wastes of the sugar refining industry known as bagaso; the development of nuclear power.

These avenues have been codified in a program put together in 1983 by the National Power Commission. This program provides for the introduction of 31 specialized measures offering economic incentives for energy conservation, the rebuilding and bringing on line of smaller, now nonfunctional, power plants, and the use of resin wastes as a fuel. The use of various types of production wastes and secondary resources represents a promising area for conservation in this sector.

Questions of the development and application of nontraditional energy sources are currently receiving much attention in Cuba. These include wind power (several installations are operative already), biogas energy (at the experimental stage) and solar energy (a plan has been developed for solar heaters). In these areas we are very dependent on the experiences of our Soviet

colleagues. With their assistance we are conducting not only experimental work but also setting up a solid base for the practical application of solar power on Cuban soil. An experimental center that has recently been opened in the city on Santiago de Cuba is becoming the center of this base. However, the question of the use of renewable fuels ("bagaso") is receiving top priority. Suffice it to say that bagaso already represents about 40 percent of total fuel and energy resources.

The fact that in April of this year only one plant was using oil to produce sugar, and that oil consumption by this sector has declined by 96 percent in 6 years is indicative of the substantial changes that have occurred in oil and petroleum product conservation in the sugar industry.

Cooperation with CEMA countries, and especially between Cuba and the USSR, in the area of power generation is playing an important role in the development of new and alternative energy sources. Having begun 20 years ago, this cooperation received a new impulse with the signing in 1981 of an agreement whereby the USSR will provide our country with the necessary assistance for the construction in Cuba of a nuclear power plant with an 880 megawatt capacity.

The first Cuban nuclear power plant is currently being built in the province of Cienfuegos with the help of Soviet specialists. Bringing it on line will have great significance for the resolution of questions of energy resource conservation and their more effective utilization. At the same time, the USSR is cooperating in the development of a prospective plan for the further development of our national power generation capacity, which includes future plans for 2 additional AES.

The startup of these plants gives Cuba the potential not only to upgrade the structure of production and use of electric power, but also to install state of the art equipment. Completing the construction of two units at the AES in Cienfuegos will make it possible to increase by a factor of 1.5 the installed capacity of all the functioning power plants in the republic.

CEMA Facts, Figures in Brief

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jun 84 p 3

[Briefs: "Facts and Figures"]

[Text] Thanks to the implementation of measures within the context of national programs for fuel and energy resources conservation, savings in 1980 (in comparison with 1975 levels) in Bulgaria, Hungary, the GDR, Poland, the USSR and the CSSR totalled 144 million tons of standard fuel. In 1985 this figure is projected to increase to 250 million tons.

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The CEMA countries have been assigned the task of saving 95 million tons of standard fuel by 1985 by utilizing secondary energy resources.

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A saving of only one gram of standard fuel in the generation of 1 kilowatt hour of electricity at thermal electric power plants and a reduction of electricity losses in the power grid by 1 percent will make it possible to conserve an average of 2 million tons of standard fuel by 1985 within the CEMA.

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Thermal waters in the CSSR are an irreplaceable source of supplementary heat for certain cities. In the central heating system for the city of Galant the hot water comes directly from artesian wells. On an hourly basis underground "storerooms" in Slovakia provide 700,000 liters of hot water. The energy obtained from thermal waters makes it possible to conserve almost 40,000 tons of lignite.

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More than 5 million tons of lignite ash, a byproduct of thermal electric power plants, were used last year in the GDR as a secondary raw material. The ash is added to the basic fuels for these same power plants. This use for ashes makes it possible to conserve more than 600,000 tons of lignite per year.

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At the Shagotar'yanskiy Glassworks, hot gases produced in the furnaces are used to preheat water and for heating. Last year the specific consumption of energy in the Hungarian construction materials and construction industry declined by 5 percent.

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The winner of the traditional competition for energy and fuel conservation in Bulgaria was the Varna TETs collective, which met its target for electricity generation while conserving nearly 22,000 tons of coal and 1,200 tons of mazut. At the same time, the power industry workers reduced electricity consumption for their own requirements by 7 million kilowatt hours.

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Large sums have been allocated on Poland to measures directed at reducing the energy intensiveness of production. The chemists at the Balakhovna Combine have been awarded 60 million zlotys. The collective at the tire plant at Debica has been allocated even more, 80 million zlotys. Similar sums have been allocated to metallurgists, cement industry workers, and woodworkers.

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Approximately 40 percent of the heat generated during equipment operation finds a secondary application in various industrial sectors in the GDR. Projections for this year are to increase this figure by 5 percent.

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Electricity generation increased in Cuba in 1983 by 4 percent at the same time that energy consumption increased by only 1.7 percent, and that of petroleum products by 0.3 percent. This resulted in the conservation of more than 500,000 tons of oil.

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Specialists at the South Moravian Machine Building Plant, ChKD-Blansko [Ceskomoravska-Kolben-Dansk] have completed designing equipment for small hydroelectric power plants.

Starting production of this equipment for small GES will take place based on a program for their reconstruction, restoration and construction which was adopted by the CSSR Government with the objective of utilizing to the maximum domestic energy resources. The economic efficiency of these programs has been fully documented. According to expert calculations the production of 1,000 kilowatt hours of electricity at a small GES will be 30 percent less expensive than at thermal power plants run on solid fuels.

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